THE

VETERINARY JOURNAL

Editor :
PROF. SIR FREDERICK HOBDAY, C.M.G., F.R.C.V.S., F.R.S.E., Dr. Med. Vet. (*h.c.*) Zurich, Hon. Vety. Surgeon to His Majesty the King, Emeritus Professor of Surgery in the Royal Veterinary College

Sub-Editor :
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in collaboration with

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Retford

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Biography

PROFESSOR JOHN SHARE JONES, D.V.Sc.(Liv.), M.Sc., F.R.C.V.S., Dr. Med. Vet. (h.c. Berne)

THE announcement that Prof. Share Jones retired from the Directorship of Veterinary Studies and from the Chair of Veterinary Anatomy in the University of Liverpool must have come as a surprise to many of our readers.

He is a man in full vigour of physical and mental health and upon whom the years sit lightly. By his retirement he has shown that he has remained true to one of his great ideas that " Youth should be given a chance."

XUM

It will be strange to think of the Liverpool school without Share Jones. He assisted at its birth, nurtured its sickly childhood, rescued it from adolescent death and after he assumed the reins of direction saw it grow to vigorous and successful manhood.

Prof. Share Jones was born at Cefn Mawr in North Wales, and received his early education at local schools, schools which, in spite of the modern bourgeois tendency for public school education, have produced a type which has won its way to the highest office by merit alone. He later proceeded to King's College and University College, London, where his education was developed on broad scientific ground, giving him a sound foundation on which his chosen calling could be based.

He entered the Royal Veterinary College and after a distinguished studentship he graduated M.R.C.V.S. in 1900.

After a period of work in Paris and as surgical tutor and demonstrator in anatomy at the R.V.C. he proceeded to Liverpool when the Veterinary School of the University was founded in 1904. He was appointed Lecturer in Veterinary Anatomy and entered whole-heartedly into the development of the school.

In 1906 he was appointed secretary of the Board of Veterinary Studies. In 1907 he obtained the Fellowship of the R.C.V.S. In 1917 he was appointed Director of Veterinary Studies when that post was first instituted by the University of Liverpool. When the Chair of Veterinary Anatomy was established in 1919 Share Jones was selected to fill the post and so he became the first Professor of Veterinary Anatomy in the country.

During his term of office Prof. Share Jones was mainly instrumental in the institution of a university degree in Veterinary Science. This degree was intentionally designed to require a greater expenditure of time, effort and money than the licence to practise. It was intended that it should serve as an academic distinction for those who were prepared to go further than their fellows. How well this intention has been fulfilled is shown in the school at the present time, for out of the 161 students no fewer than 118 are proceeding to the degree.

Under Prof. Share Jones' direction the school has progressed from the humblest of beginnings to its present position as a leading institution of its kind.

Prof. Jones has always said: "If the posts or chairs are endowed or secure the rest will follow." Largely due to his efforts there are at present two chairs and several established lectureships in the Liverpool school.

An able teacher, Prof. Jones has not confined his efforts to the parochial boundaries of pure anatomy, but he has exhibited a breadth of vision which is given to few. His conception of Veterinary Science has not been dulled or

limited by a stress of his own particular subject to the detriment of others in the curriculum.

His publications, which number over 100, include work on surgical anatomy, comparative anatomy, animal husbandry, agricultural education, veterinary state medicine and insurance, etc. He contributed to the 13th edition of the Encyclopædia Britannica.

For over 30 years Prof. Share Jones has conducted, at his own expense, a private research station at Trefynant and Pentrebychan in North Wales. Investigations have been conducted on a variety of problems relating to genetics, heredity and sterility. The breeding of particular types has also been investigated with some remarkable results.

He has evolved a method of treating sterility which has been applied with considerable success. The latter investigations are still being pursued.

In 1928 he was awarded the Steel Memorial Medal of the Royal College of Veterinary Surgeons (the highest distinction) for distinguished work in connection with his profession, and in the following year he attained the highest position in his profession, namely, the Presidency of the Royal College of Veterinary Surgeons. The Federation of Meat Traders' Associations honoured him by electing him Honorary Vice-President of the Federation. Prof. Share Jones was recently appointed a member of the Livestock Advisory Committee of the Government Livestock Commission.

He has served on many Government and other committees, notably the Read Committee which set up a veterinary organisation for the colonies, and the Martin Committee on the Royal Veterinary College. He has also served on the Selection Committee for the appointment of University Chairs in South Africa, and his advice on agricultural education has been sought by the Government of Peru.

Prof. Share Jones is recognised internationally as a pioneer of Veterinary Science, and has been invited to give addresses at many continental universities. At the festival commemorating 100 years' progress in university education held at the University of Berne, Switzerland, in 1934, he achieved the distinction of being the only British representative to receive an honorary degree. The Doctorate conferred upon him was awarded in recognition of his work in "expanding the conception of his science and increasing the possibility of its service to the community, thereby advancing the cause of university education." He was also awarded the University Medal.

Perhaps the greatest work of Prof. Share Jones has been the contribution he has made towards the conversion of public opinion in this country to an appreciation of animal husbandry as being the most important division of British agriculture. He was responsible for making the production of such necessaries of life as meat, milk, butter, and such foods derived from animals

an integral part of the policies of our political parties. He urged this view at many conferences—at Birmingham, Kingsway Hall, Oxford, Queen's Hall, Great Yarmouth, etc., and finally at Torquay in 1929 his views were endorsed in the general policy of the Liberal Party. It is well known that all parties have since adopted these views. Their general acceptance is now common knowledge.

His advocacy of animal husbandry commenced as long ago as 1914, when, by invitation of Members of Parliament and representatives of local authorities, he submitted at a conference at Carmarthen a scheme for higher agricultural education for Wales, in which was included a proposal for the establishment in the University of Wales of a Faculty of Animal Husbandry and Veterinary Science, which would embrace its full complement of departments and professorships. His scheme was approved and published by the Welsh Agricultural and Rural Development Association.

Prof. Share Jones has since continued his advocacy persistently, and he presented evidence in support of such a Faculty and debated it before Lord Haldane's Royal Commission. His proposals were supported by a large number of local authorities in Wales, and had the approval of the University of Liverpool with which he was connected. Furthermore, appreciating the importance of stimulating public opinion, he carried the matter before our political parties in the manner stated and made animal husbandry as the means of producing some of the greatest necessaries of life a subject of public controversy amongst parliamentarians.

He himself put the policy to a practical test with the result indicated below.

In 1930, at the International Veterinary Congress held in London, Veterinary Science was first considered in its relation to animal husbandry. He was one of the three selected in Paris to deal with it. His colleagues were Professor Markoski, of Poland, and Professor Huertz, of Czecho-Slovakia. The views they put forward gained support very rapidly in some countries, though somewhat more slowly in Britain. At the last International Congress recently held at Zurich they were generally accepted and the policy adopted.

For many years, in this country and abroad, he has urged the institution of a general system of insurance in animal husbandry as a means of transferring the risks now imposed upon individuals. He considers this element of risk one of the greatest menaces to the industry. It is of the highest interest to note that at the present moment serious attention is being given to this question in many influential quarters.

With this evidence before us no one can claim to have done so much to bring this country to a sense of its responsibility in relation to our domestic animals and our dependency upon them. It would be difficult to estimate our indebtedness to the efforts that he has been making in this connection for so

many years. It is gratifying to see that these efforts have been recognised amongst scientists at so many continental centres such as Brussels, Ghent, Bordeaux, Berne, Zurich, etc.

Prof. Share Jones has taken an active part in public life and has served on most of the various local government authorities. At the General Election in 1929 he was Liberal candidate for the Shropshire (Oswestry) Division, and he contested his seat on the policy mentioned above. In a traditionally Conservative constituency he was successful in nearly doubling the Liberal vote. The public of Cefn Mawr, which for many years he had served in almost every conceivable public capacity, paid tribute to "the public services and personal attainments" of the Professor and his wife by presenting them with an illuminated album recounting their various activities, together with their portraits in oils by James Grant.

No account of Prof. Share Jones would be complete without some reference to his wife, Dr. Mary Share Jones, who, like himself, has an international reputation and is well known at many continental centres for her literary work. She has had a remarkable career, for, after graduating B.A. with honours at the University of London, she took up the study of Law and was the first woman to graduate LL.B. This she did at the University of Liverpool, taking the degree with first-class honours—a rare distinction. Since women were not then admitted to the Bar she turned to Medicine and graduated M.B., Ch.B., and later took the degree of M.D. in public health. She has worked for a period each year at Vienna. She was a daughter of Mr. Howel Jones, of Wrexham, and ably shared public platform work with the Professor during his political campaigns.

Prof. Share Jones is well deserving of a rest, but those who know him best will know that retirement to him simply means a transference of his activities to another sphere of usefulness to his profession and to the community. We wish him God-speed knowing full well that whatever he sets his hand to will be undertaken with the selfsame integrity of purpose and fearlessness which has characterised him in the past, as was so ably stated in the following resolution which was passed by the Senate of the University of Liverpool:

"That the Senate desires to express to Professor Share Jones on his retirement its appreciation of his services to the School of Veterinary Science and to the University during a period of 35 years. His powers of advocacy, his steadfastness of purpose and his devotion to the advancement of his science and his profession, have led to the firm establishment of the University as a leading centre for the teaching of Veterinary Science in Great Britain. His success has been due no less to his kindliness of heart than to his energy of mind, and Senate begs him and his wife, Dr. Mary Share Jones, a graduate of the University, to accept its best wishes for many years of health and happiness."

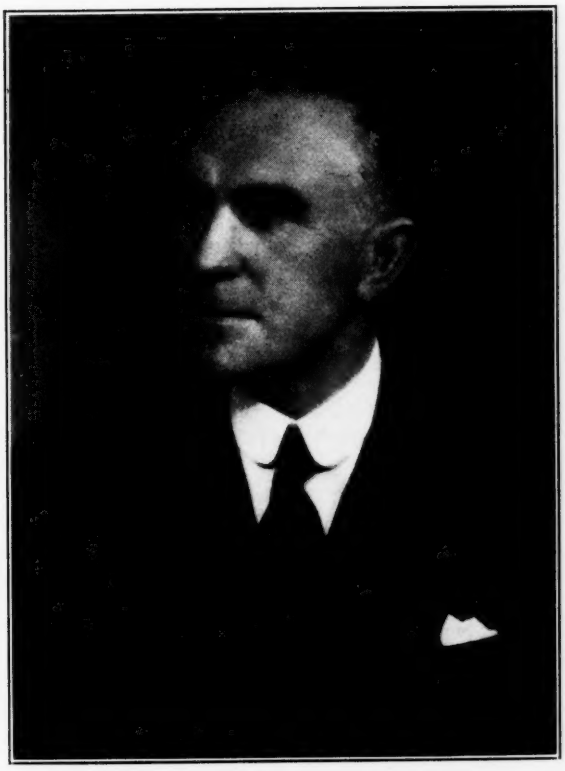
MAJOR BRENNAN DE VINE, M.C., F.R.C.V.S., D.V.S.M.

No name is better known in the world of veterinary public health than that of Major Brennan de Vine, and his election as President of the National Veterinary Association for the present sessional year was a most popular one. Born at St. Johns in Newfoundland in 1881 and educated at Rockwell College in Ireland, he commenced his veterinary career in the Dick College, completing it in Dublin, graduating from there in 1903. Taking a Post-Graduate course in London in 1906, his Fellowship in 1908, he gained the Diploma of State Veterinary Medicine from Victoria University (Manchester) in 1910 — a variety of study centres which few men can show.

His appointment in 1906 as assistant to the late John Malcolm, Veterinary Adviser to the Corporation of the City of Birmingham, was a piece of good fortune for each, for never had a young enthusiast a better preceptor nor ever a master a more faithful and loyal pupil. The good effect upon the public health side of the veterinary profession cannot be overestimated, for John Malcolm was a pioneer in this work and Brennan de Vine has proved a worthy successor.

The Corporation of Birmingham has been fortunate in their selection, as the Veterinary Department which Major de Vine controls is one of the largest and best managed in Great Britain. Owing to the lamented death of Mr. Malcolm the mantle of Chief Veterinary Officer fell upon Major De Vine's shoulders in 1920.

Busy men always find time to do more and the offices which de Vine has filled include the Presidentship of the Midland Counties Veterinary Medical Society, the Fellowship and Examinership of the Worshipful Company of Farriers, the Fellowship and Examinership of the Royal Sanitary Institute, Lectureship in Public Health, Meat Inspection and Sanitary Science (also on Horse Shoeing and Farriery) at the Central Technical College, Birmingham, and for some time he was an Examiner for the R.C.V.S. in Stable Management. Hunting, swimming and tennis help to keep him fit. Truly the National Association have placed their Presidential Chair in " live wire " hands and the important events of the present session which fall within the category of their Council will receive full and masterly consideration.



MAJOR BRENNAN DE VINE, M.C., F.R.C.V.S., D.V.S.M.(Vict.)

Editorial

PROGRESS IN INDIA

THIS special number, devoted entirely to India, should be of interest to many who have never visited that country, and those who have may be glad to hear something of certain developments of veterinary and animal husbandry work during recent years.

A review by Mr. Frank Ware, than whom no one has done more for veterinary progress in India, gives an indication of the huge numbers of stock which are maintained in the sub-continent, and those who know something of the prevalence of disease among Indian stock will appreciate that the task of provincial and state veterinary services is an immense one.

But cattle in India mean much more to the cultivator than in other countries. They are the source of animal labour, the providers of milk, fuel and hides, and the potential producers of the fertility of the soil on which the great bulk of the people of India directly depend for their livelihood.

Any measure which saves their owners from the economic collapse which all too often in the past was involved in an outbreak of rinderpest is therefore a boon of great magnitude. Thus the great success which has recently been attained in the systematic improvement of cattle, by official action, and in the evolution of a satisfactory process of immunisation against rinderpest (for the plains cattle of India) as well as the great advance which has been made by systematic investigation and research into numerous other veterinary problems of India, has been of great benefit to the country and should rebound much to the credit of the veterinary services.

Moreover, though he has no administrative power, the appointment some eight years ago of an animal husbandry expert to the Imperial Council of Agricultural Research has enabled a start to be made in securing for the veterinary services a larger share in the control and development of animal husbandry than was previously the case.

For example, during the past few years arrangements have been made at Izaathnagar, the sub-station of the Muktesar Research Institute, for research upon animal nutrition and its effect on health and development and on poultry diseases and on breeding problems.

A separate Dairy Institute to deal with dairy questions of all kinds has also been established.

The work of the Muktesar Veterinary Research Institute has also been organised in sections by its Director and financial provision has been made to

employ specialists to take up the systematic study of tuberculosis, Jöhne's disease and contagious abortion in India.

Thus it should now be possible for an all-round advance to be made for the development of all aspects of animal industry in India, on lines similar to those followed in more advanced countries, and we confidently look forward to an increasing output from research on animal diseases in that country.

General Articles

THE DEVELOPMENT OF VETERINARY SCIENCE IN INDIA

By F. WARE, C.I.E., F.R.C.V.S., I.V.S.

Animal Husbandry Expert, Imperial Council of Agricultural Research, India.

THE importance of veterinary science to India can best be gauged by making a brief reference to the size and value of the cattle industry of this vast agricultural country. According to the fourth livestock census held in 1935 it is estimated that India has 215 millions of cattle, which is about one-third of the world's cattle population of 690 millions. Next in order are the Union States of Soviet Russia (65 millions) and the United States of America (58 millions), each of which contains less than a third of India's livestock strength.

The total annual cash value of India's cattle industry, including the value of dairy products, labour rendered to stock-owners, and manure, has recently been estimated at about 1,300 crores* of rupees. The agricultural resources of the country have been assessed at a total of 2,000 crores of rupees, to which the cattle industry therefore contributes more than half. The potential value of cattle as a means of raising the fertility of the soil and thus increasing the output of agricultural products is estimated roughly at 270 crores of rupees.

* One lakh of rupees = £7,500 approx. 100 lakhs = 1 crore.

The monetary value of milk produced in India is estimated at 300 crores of rupees per annum. Cattle labour for draught purposes represents the most important contribution of livestock to Indian agriculture and the value works out at 400 crores of rupees per annum. Miscellaneous products, such as hides, skins, etc., are valued at 40 crores of rupees per annum.

The existence of veterinary literature in India dates back to the *Vedas*, whose origin, according to Grassman and Benfey, was somewhere about 2000 B.C., while Prof. Jacob, of Bonn, supposes the date to go back to 4000 B.C. Particulars of the treatment of worms in cattle, manufacture and administration of certain indigenous drugs to animals, such as elephants, horses, camels, cows, sheep and goats, the care of cows in pregnancy, and the management of elephants and horses in both health and disease are described in vedic literature by *rishis* or saints. Mention is also made of domestic animals receiving veterinary aid during the time of Buddha (5th century B.C.) and Chandra Gupta (316 B.C.). Veterinary work appears to have made some progress in India during ancient and medieval times, and the Government Oriental Manuscript Library, Madras, the Adyar Library, Madras, the Palace Library, Tanjore, and the Indian Archæological Department have records in their possession in support of this statement.

The Assam Government published in 1932 a translation of a work on the diseases of the horse and their remedies known as " Ghora Nidan," the original of which was published in 1734. There is also mention of a treatise on elephants, " Hasti-vidyarnava," during this period.

In 1774 the East India Company started some horse-breeding farms, but their operations were reported to be unsuccessful and disease was rampant.

The earliest official reference to veterinary work in India is an Army Order dated April 8, 1793, stating that upon the appearance of a supposed infectious disease among horses the affected ones will be removed and the matter reported to the officer commanding the station, who will order the animals to be inspected by persons who may be judged capable of distinguishing the disorders of horses. Evidently there were no qualified veterinary men in India at that time, but in 1799 five trained veterinary officers were recruited from England, although two of them were soon invalided and sent back home. Among the early British veterinarians the name of William Moorcroft is recorded as a man of outstanding ability. He was appointed as Superintendent of the Horse-breeding Farm located at Pusa in Bihar by the East India Company, and his salary was fixed at £3,000 a year to compensate him for a lucrative practice he had in London. He landed in Calcutta on November 14, 1808. To a man of his ability the suppression of disease was a relatively simple matter, and under his careful management and improved methods of feeding the grave losses were reduced by 90 per cent. The cultivation of oats in this country was first introduced by him. He undertook extensive tours in Central Asia to purchase horses, to report on the openings for trade, to deter-

mine the position of important towns and to furnish a geographical description of the countries visited. His first journey was in 1812, and the second in 1819. While returning from the second journey he was murdered on August 27, 1825, and his property, including his journals containing a mine of information, plundered. His journals were recovered many years later by subsequent explorers and are now in the India Office, London.

After Moorcroft's death the performance of veterinary duties again fell to unqualified officers of the army, but there was a recrudescence of heavy mortality among the animals, and the authorities decided to have qualified veterinarians. In 1827, therefore, twelve veterinary surgeons and in 1828 a further 13 were brought to India for the care of army animals. The total strength of veterinary surgeons in this country in 1833 was 31.

In 1850, J. H. B. Hallen came to India as staff veterinary surgeon under the East India Company. His recommendation for the formation of an Indian Civil Veterinary Department with schools for training students was the first step in the development of veterinary work amongst the agricultural classes in India. In 1862 he became Inspecting Veterinary Surgeon of the Bombay Army, and in this capacity he organised a veterinary service and established an army veterinary school at Poona. In 1869 he was appointed President of the Cattle Plague Commission by the Government of India, and from 1872 to 1876 he organised the horse-breeding operations of India of which he was the Superintendent. In 1877 he opened a veterinary school at Babugarh in the United Provinces for training men in the duties of salutris and castrators. This school is of interest for, besides being the first of its kind established in India, it was transferred to Lahore in 1882, with Col. G. Kettlewell as Principal, and in 1900 became the now well-known Punjab Veterinary College. This college in 1905 also absorbed the staff of the veterinary school which had been opened in Ajmere in 1894, and in 1915 it moved to its present commodious site and buildings.

In 1881, Griffith Evans, of the Army Veterinary Department, demonstrated for the first time a protozoan organism—now known as *Trypanosoma evansi*—as the causative agent of surra in horses.

The first number of the *Quarterly Journal of Veterinary Science in India and Army Animal Management,* edited by Prof. J. H. Steel, appeared in October, 1882. This periodical had a short life of eight years and it became defunct in 1890.

In 1882 veterinary courses appear to have been given in Madras at the Saidapet Agricultural School by Lieut. J. Mills, Army Veterinary Department. The curriculum of this school at that time contained, among other subjects, veterinary medicine and surgery, and the course extended to three years.

In 1883 the Government of Bombay decided to establish a veterinary college for providing a scientific knowledge of the diseases of animals in Western India. The committee appointed for the purpose, after nearly three

years' deliberations, opened the college on August 2, 1886, in the compound of the B. S. Dinshaw Petit Hospital for Animals, with Prof. J. H. Steel as its first Principal.

In 1888 steps were taken for the organisation of a Civil Veterinary Department in India and in October, 1889, this department was formally established. The personnel in the first instance consisted of 18 officers seconded from the Army Veterinary Department and a small number of partially trained men called stock inspectors, who were gradually replaced by properly qualified veterinary graduates, the whole being brought under the supervision of an Inspector-General, Col. J. H. B. Hallen, in 1892. The primary duties of the department were defined as horse-breeding, animal disease, and instruction.

In 1890 the post of an Imperial Bacteriologist was created by the Government of India and the services of Dr. Lingard were secured for this post "to investigate diseases of domesticated animals in all provinces in India and to ascertain, as far as possible, by biological research both in the laboratory and, when necessary, at the place of outbreak, the means for preventing and curing such diseases."

Dr. Lingard carried on his researches in the laboratory attached to the Science College, Poona, till 1893, when it was decided to remove the laboratory to a cooler place at Mukteswar, in the foothills of the Himalayas in the Kumaon Division of the United Provinces.

The establishment of a Veterinary College in Calcutta was first recommended by the Cattle Plague Commission in 1871, but no action was taken until 1891, when Babu Sheo Baksh Bagla generously gave Rs. 30,000 and offered 7½ bighas of land for a site. Sir Dinshaw Monochjee Petit also promised a donation of Rs. 25,000 for the establishment of a hospital, and in January, 1894, a Veterinary School was first opened in Calcutta. In 1898 this school was raised to the status of a college with Col. F. Raymond as Principal.

In 1897, Prof. Koch, the famous German bacteriologist, visited India and demonstrated the methods that had been successfully adopted to protect cattle against rinderpest in South Africa. As a result of this visit a potent anti-rinderpest serum was first prepared at Mukteswar in 1899 for use in the field where it soon met with success. From 1901 onwards the manufacture of anti-sera against other fatal diseases, such as anthrax, hæmorrhagic septicæmia, etc., was taken up.

The year 1901 was noteworthy for the appointment of a Superintendent of the Civil Veterinary Department in the Punjab and the organisation of a provincial service of veterinary assistants to deal with disease and cattle-breeding problems in this province. This step was taken in accordance with a scheme which had been circulated by the Government of India in October, 1893, and this lead was later followed by other provinces.

In August, 1901, rules for army veterinary officers serving in the Indian

Civil Veterinary Department were sanctioned and promulgated and all the 17 officers who were serving at that time accepted them. Further recruitment from the Army Department was then stopped, and five direct recruits were obtained from England, thus raising the number of gazetted staff to 22. The names of these five civil officers should be recorded. They were S. Stockman, R. E. Montgomery, J. E. Jethiji, K. Hewlett and E. W. Oliver, all of whom unfortunately have "passed over." The subordinate staff employed in the department at this time totalled 250, which included eight veterinary inspectors. There were 98 veterinary hospitals and dispensaries working during this period, and the work of the department could now be described as well established and in a position to expand. In 1903, however, as a result of the recommendations of the Horse-Breeding Commission, the principal work connected with horse-breeding operations was transferred to the Army Remount Department and this step may be said to have initiated a period of decline in the prestige and status of the Civil Veterinary Department in India from which it took many years to recover.

The present Madras Veterinary College was opened in 1904 with Major W. D. Gunn as Principal. In recent years the buildings have been extended to provide increased laboratory accommodation and facilities for carrying on research and the manufacture of biological products. More recently a small dairy has been established in connection with this college to provide increased facilities for training students in the care and management of animals in health.

In 1905, as a result of a grant of Rs. 20 lakhs for the improvement of agriculture, the strength of the Imperial Service was increased by six, and further progress was made possible in some of the provinces in the matter of providing more dispensaries and paying closer attention to the control of contagious disease.

In 1906 the *Journal of Tropical Veterinary Science,* edited by Col. H. T. Pease, Major F. S. H. Baldrey and R. E. Montgomery, was started with a view to afford a medium for the publication of articles on veterinary and allied sciences as met with in tropical and sub-tropical countries. This publication, like its predecessor, however, was short-lived and was discontinued in 1912, with the abolition of the post of Inspector-General of the department.

In February, 1908, a veterinary conference of senior veterinary officers, the Inspector-General of Agriculture and the various Directors of Agriculture was held in Calcutta to discuss questions connected with the establishment of a Board of Veterinary Science, veterinary research, education, publications, cattle export, etc. The conference was productive indirectly of much good as it gave directors and veterinary officers an opportunity of meeting together and discussing various questions concerning the activities of the department.

In the Bombay Presidency the horse-breeding operations were handed back to the Provincial Veterinary Department in 1910, but on the grounds of

economy they had to be conducted on a much smaller scale with a reduced establishment. Similarly, the Government Cattle Farm at Hissar, which up to that time had been under the direct control of the Inspector-General, Civil Veterinary Department, was handed over to the Punjab Civil Veterinary Department. The Civil Veterinary Department by this time had gained a good deal of knowledge regarding cattle-breeding conditions in many provinces, and had collected and recorded much valuable information on the subject, but in 1912 work in connection with cattle breeding was transferred to the Agricultural Department in all provinces except the Punjab, where the superior veterinary staff had always been larger than in other provinces.

Another shock to the department was the abolition of the post of Inspector-General, Civil Veterinary Department, from April 1, 1912, and the control of the Mukteswar Institute passed to the late Agricultural Adviser to the Government of India. At this time the number of veterinary hospitals had risen to 353 and the total strength of veterinary subordinates was 908, including 81 veterinary inspectors. The cost of the department had risen to Rs. 27 lakhs in 1912 from Rs. 1 lakh in 1901.

From 1913 the scientific activities of the department were published in the Veterinary Series of the Memoirs of the Department of Agriculture in India and in the bulletins of the latter department. As a result of the Great War which broke out in 1914 advancement in several directions was retarded, more especially in regard to the provision of veterinary assistants. The superior and subordinate grades of the department were reduced to the lowest possible scale and out of 28 European officers ten were entirely released for military service. A large number of the remaining officers worked in the Indian Defence Force in addition to their own duties, and the names of Col. H. T. Pease, Col. G. Evans, Col. G. K. Walker and the late Major K. Hewlett were particularly mentioned in this connection.

The Board of Agriculture at its meeting held in December, 1917, decided to hold periodical meetings of veterinary officers every three years, and in March, 1919, the first sectional meeting of these officers was held at Lahore, where several resolutions for the progress of veterinary science in India were passed. The meeting laid stress on the inadequacy of the constitution and organisation of the Civil Veterinary Department to cope with the work demanded of it, on the importance of a large expansion of all provincial work of the country, and the necessity for placing the department in a position to deal with the diseases of animals, veterinary instruction and all operations for improving livestock in India.

In 1920 the department consisted of 42 gazetted officers, 1,220 veterinary subordinates and 537 veterinary hospitals and dispensaries. The cost of the department by this time had risen to about Rs. 41½ lakhs.

The second meeting of veterinary officers was held in 1923 at Calcutta when a large number of technical and professional subjects were discussed

including the role of the department in dealing with problems concerning the livestock industries in India, and the advisability of amalgamating certain veterinary services in connection with the control of equine diseases in selected horse-breeding districts.

In 1926 the Royal Commission on Agriculture in India was appointed to examine and report on the conditions of agriculture and rural economy in India and to make recommendations for their improvement and the promotion of the welfare and prosperity of the rural population; particularly to investigate the measures taken for the promotion of agricultural and veterinary research, experiment, demonstration and education and for improvement in dairy farming and the breeding of stock, etc., etc. In 1927 there were 84 gazetted officers, including 32 officers in the Indian Veterinary Service, the new name for the Imperial Service Officers of the Indian Civil Veterinary Department, and about 1,400 veterinary subordinates. The Royal Commission was of the opinion that the provision of veterinary aid was totally inadequate, and recommended a very substantial increase of veterinary officers of all grades, at the rate of one veterinary assistant surgeon for every 25,000 cattle and one gazetted officer for each district with an average of about 600,000 cattle. According to this estimate, British India with 272 districts would require 300 officers and 6,000 veterinary assistant surgeons, in addition to a Director of Veterinary Services, for each province and a Principal for each veterinary college. At the time of writing there are only 133 gazetted officers and 1,902 veterinary inspectors and veterinary assistant surgeons in the department.

The proposal of the Royal Commission for the constitution of an Imperial Council of Agricultural Research was given effect to in 1929. This Council consists of an Advisory Board, which is the scientific and technical side of the organisation, and a Governing Body, which controls policy and finance. The heads of all Provincial Agricultural and Veterinary Departments are on the Advisory Board, and the Ministers of Agriculture of all provinces are on the Governing Body with two representatives from the Advisory Board. The secretariat consists of a chairman, a vice-chairman, an agricultural expert, an animal husbandry expert, two assistant experts, one secretary and the usual clerical staff. This Council is to aid, develop and co-ordinate agricultural and veterinary research in India by promoting scientific methods and practice of agriculture and by promoting veterinary research and instruction in veterinary science, by the diffusion of useful information and by such other means as appear calculated to develop agricultural and veterinary research; and also to act as a clearing house of information regarding agricultural and veterinary matters. The Imperial Council of Agricultural Research has, during the past eight years of its existence, dealt with several schemes costing in all over a crore of rupees, of which 33 schemes relate to veterinary and animal husbandry research costing about Rs. 17 lakhs, and these are now in process of being implemented.

In 1931 the Council took over the publication section of the Imperial Department of Agriculture in India, and matters relating to the livestock industry and veterinary science are being published in two new journals, viz., a quarterly scientific *Indian Journal of Veterinary Science and Animal Husbandry* and a bi-monthly popular known as *Agriculture and Livestock in India*. The Council also publishes occasional scientific monographs, and miscellaneous bulletins on these subjects whenever required.

In 1930 a veterinary college was opened at Patna on the recommendation of the then Director of Veterinary Services, Mr. D. Quinlan, who had the vision to establish, in conjunction with the college, an extensive cattle-breeding and dairy farm for the training of the students in the care and management of livestock.

The Board of Agriculture in 1929 decided to split itself into two large wings—one for crops and soils and the other for animal husbandry and animal health. The first meeting of the latter wing was held in February, 1933. Several resolutions regarding the improvement of livestock, veterinary education, legislation for the control of certain diseases of animals, animal nutrition, etc., were passed at this meeting.

Of the various schemes sanctioned by the Imperial Council of Agricultural Research for the improvement of livestock in this country, mention should be made of the appointment of disease investigation officers in all provinces for a period of five years in the first instance. The veterinary members of the Advisory Board of the Imperial Council recommended in 1935 that these disease investigation officers and other animal husbandry research workers should be invited to a meeting to discuss their common problems in connection with animal diseases, animal nutrition, cattle breeding, etc. Accordingly in February, 1936, the first Animal Husbandry Research Workers' Conference was held at New Delhi. This is the first time that such a representative meeting embracing all branches of animal husbandry has been organised in India with a view to co-ordinating research on a variety of subjects, all of which are required for the development of animal industry. In the past the greater part of the research work on veterinary and animal husbandry subjects in India was confined to the study at Mukteswar of the major plagues of livestock, and results of great economic value to stock-owners have been achieved, but much remains to be done in this and other directions. In particular, an organisation is needed for applying to Indian conditions the results of pathological, biochemical and other forms of research, and the veterinary investigation officers will serve as a link between the Mukteswar Institute and the field staffs concerned with livestock improvement in the provinces. A systematic study is now being made of the problems connected with the scientific breeding, rearing and feeding of livestock and with the proper utilisation of such animal products as those connected with dairying, poultry-keeping, wool and hair,

hides and skins, etc. An effort has also been made to co-ordinate the work of the central research institutes with cognate work in the provinces and to train workers through the medium of practical investigation in the field so as to fit them eventually to undertake research on more fundamental problems concerning the health, development and proper exploitation of livestock.

From the above review it will be seen that with the formation of the Imperial Council of Agricultural Research and the appointment of a veterinary officer as the animal husbandry expert thereto in 1929, a new era in veterinary science in India was initiated and the future largely depends on the ability of the rising generation of veterinary graduates to take advantage of the good foundations which have been laid for the development of this science on proper lines, i.e., as the basis of all livestock improvement work. The administrative changes in this matter which have taken place from time to time in the past have undoubtedly done much to hinder advancement, but if there be any advantage in the system of trial and error, then we may look forward to an ultimate improvement of some magnitude.

Whereas 25 years ago it was considered inadvisable to trust veterinary departments with any duties other than those connected with the prevention and cure of disease, the pendulum is now swinging the other way again and in some provinces, e.g., the Punjab and Madras, combined Veterinary and Animal Husbandry Departments have now been set up. On scientific grounds this is the only rational way of dealing with the subject of livestock improvement, for as child welfare and human nutrition must be combined with preventive medicine to deal adequately with public health, and plant breeding and plant physiology are never separated from plant pathology by those who deal in crop husbandry, so must animal breeding and animal nutrition be combined with veterinary medicine if sound advances are to be made in the subject of animal husbandry.

But in order to provide a suitable staff to undertake the duties arising out of such an organisation, which, incidentally, is now being found necessary in many countries besides India, veterinary educational authorities will need to take stock of the position in some of the Empire veterinary colleges, which at present do not provide a sufficiently comprehensive training for students desirous of graduating as experts in animal health, and not merely as veterinary surgeons competent to practise the art and science of veterinary medicine and surgery.

In the compilation of this review I have received much help, which is gladly acknowledged, from Mr. Krishnamurti, the Librarian of the Imperial Veterinary Research Institute, Mukteswar.

VETERINARY WORK IN THE NORTH-WEST FRONTIER PROVINCE, INDIA

By KHAN SAHIB S. M. A. SHAH, B.Sc.(Punjab), M.R.C.V.S.

As its name denotes, the province is situated on the North-West Frontier of the Indian Empire. The approximate area is 38,665 square miles, of which 13,193 are British territory, the remainder being held by the tribes under the political control of the agent to the Governor-General.

The settled districts of the province form two main tracts, which differ markedly in their agricultural conditions. The first lies east of the Indus. Here a good spring crop is assured, but the autumn harvest is inferior. The other tract west of the Indus may be subdivided into stony uplands and level plains. In both these tracts the rainfall, which averages less than 20 inches in the year, is uncertain in amount and uneven in distribution. The Peshawar and Bannu valleys are well irrigated by canals taken from the Swat, Kabul and Kurram rivers, and are intensively cultivated. In Marwat, which depends upon rainfall, the harvests are uncertain and scarcity of *kacha* fodder and famine are more common, and in D.I.Khan the crops depend upon the embankments which hold up the surface water. Then there are the barren hills of Waziristan, Teri Tehsil, the Khyber with scanty and bushy growth.

The province exhibits considerable diversity of physical features and the soil varies in its fertility and production. The mainstay of this province is agriculture.

The Civil Veterinary Department was established in 1901 in this province, but for over a score of years it had only a nominal existence. A few ill-equipped veterinary hospitals in the principal cities in the charge of very poorly qualified veterinary assistants and a few nondescript bulls located at odd places in the charge of landlords (who seldom allowed free service of the bull to an average farmer) was all that constituted the Civil Veterinary Department then. The province possessed no noteworthy breed of cattle except the Peshawar buffalo, which is used for draft and will carry to market 10-15 maunds (82 lbs. per maund) of agricultural produce. The majority of cattle required for plough were purchased from the Punjab at high prices and thus there was a heavy continuous drain on the very limited resources of the people of this province for a considerably long period (1901-28). Cash money with the zamindars is a novelty and this is more true for the zamindars of this province and therefore at the time of the purchase of cattle every year they fell an easy prey to the village Bania, who by his Shylock-like tactics entrapped the simple Pathan zamindar in a way that the poor fellow was doomed for life. He was never able to get rid of the clutches of the Bania, because the interest increased

in geometrical progression, which the poor zamindar could never afford to pay back. Besides, contagious diseases played havoc and in the absence of any efficient means of control the zamindars of this province were always subjected to recurrent irreparable losses. A very conservative estimate of the loss from contagious diseases and also by the purchase of cattle from the Punjab could be placed at that time at Rs. 15,00,000 per annum.

Sheep and goats were bred in every district, but the material was very inferior. There were two chief breeds of sheep, viz., the thin-tailed variety of the Punjab, and the fat-tailed "Dumba." There was no particular breed of goats, ordinary *pahari* goats predominated throughout the province. The sheep and goats were mainly kept for mutton, wool and hair, but the returns were very poor. Camels were largely used for transport, but their breeding was confined in Marwat and D.I.Khan. No district had any reputation for its horses, though horse breeding was encouraged by the supply of stallions kept by the Imperial Remount Depot in Hazara. Mules and donkeys were used for local transport, but there were no facilities for their breeding. Poultry breeding was absolutely unknown in the province.

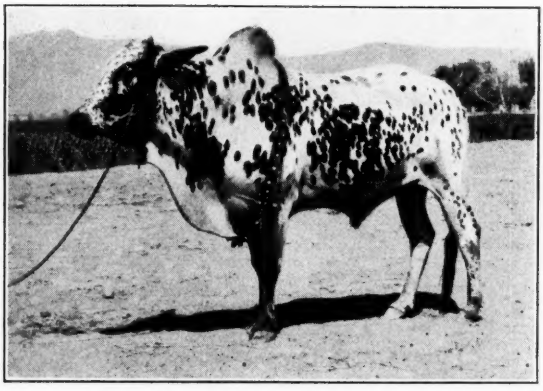
This was the state of affairs when a reorganisation of the department was commenced in the year 1927-28. The stupendous nature of the work was soon made apparent and a thorough survey of the existing conditions with a view to solving the most serious economic problems was the first step undertaken. It was very soon appreciated that the province had in her animals vast undeveloped sources of wealth, but was not getting the best out of the live-stock. There was no regular cattle breeding. Periodically the Government allotted stud bulls to khans (landlords), but the only interest these landlords had in cattle breeding was to pocket the monthly maintenance allowance which was paid by the Government for the feed and keep of bulls. No breeding records or pedigree sheets were maintained. The bulls were never properly looked after and were not kept in fit condition for breeding. Their services, if any, were limited to a small circle of the landlord's own friends.

There were only 20 such bulls for about a million cows. Under the circumstances the first and the foremost problem which attracted attention was the improvement of cattle-breeding operations.

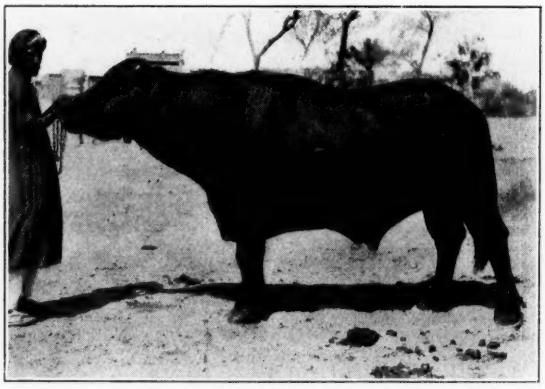
The Choice of the Breed

A number of Indian and European breeds of cattle are well known for their excellent qualities, but the following points had to be considered before deciding to introduce a new strain in this province:—

(a) Strength, activity and stamina.
(b) Resistance to disease.
(c) Suitability to local climatic condition, soil, fodder resources and water supply, etc.
(d) Price and transport expenses.



A Dhanni Stud Bull.



A Nili Stud Buffalo Bull.

ARTICLE BY KHAN SAHIB S. M. A. SHAH, M.R.C.V.S., PAGE 17.

The urgent necessity was the choice of a draft breed suitable for ploughing semi-hilly hard tracts that are so common in this province.

In view of all these considerations and by following the process of elimination it was decided that the most suitable breed for our requirements was the famous Dhanni breed of North Punjab, which is very popular with zamindars of this province and is known by the local name of "Barga." This being done, the district boards in the province were addressed to finance the purchase and maintenance of certain bulls of this breed with a view to producing plough bullocks locally and ultimately make the province self-sufficient and kill the Punjab trade. The response and the co-operation of the district boards in the province are gratefully acknowledged. In subsequent years the Government also sanctioned grants-in-aid for this beneficent activity. And at this stage the well-known North-West Frontier Province subsidy scheme of cattle breeding was launched.

In a nutshell, the scheme consists of encouragement of zamindars in the province to keep approved bulls for breeding and every form of propaganda to give effect to this in the form of speeches from the broadcasting station at Peshawar, departmental leaflets and films. Poems and speeches from loud-speakers in cattle fairs are also undertaken. Any zamindar interested in the scheme is advanced the money for the purchase of approved stud bulls, the advance being repaid in instalments of subsidy allowance. Zamindars have to pay at least Rs. 50/- towards the purchase himself as this indicates on his part his interest in the scheme. Each zamindar is allowed a subsidy allowance of Rs. 8/- per mensem and in return he is expected to allow free service of the bull to the tract in which it is located. He is also expected to keep the bull in good condition fit for breeding purposes. A monthly record of coverings is kept by the Veterinary Department. Each calf produced under the scheme has a pedigree duly registered in the departmental registers and the owners are given pedigree certificates.

Stock thus bred under the scheme fetches in some cases 4-5 times the price that is fetched by the local produce. Against about 20 odd bulls with no record or pedigree in 1927, we have at present 500 bulls and a very advanced cattle-breeding scheme with regular records and pedigree sheets. For about ten years our energies were chiefly confined to the production of plough bullocks with a view to saving the poor zamindars from the heavy burden of the purchase of these animals from the Punjab, and I am very glad to remark that within this very short period the major portion of the province has become practically self-sufficient and thus an annual drain of about Rs. 10 lakhs (one lakh = 100,000) has been permanently stopped. With all this there were still some hilly parts of the province where the Dhanni breed will not thrive and therefore for the purposes of milk *cum* work the choice fell on the Scindhi breed, which has been introduced in suitable localities last year, and although it

is rather premature to forecast anything, I am confident the results will be of immense value to the people of the *illaqa* (district).

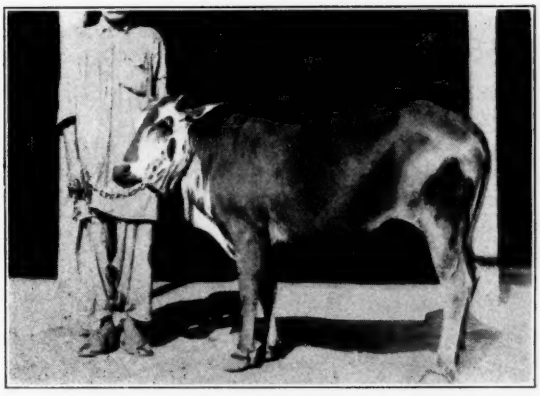
The progress of the cattle-breeding scheme in this province has since the very start been very satisfactory, but His Excellency the Viceroy's Appeal for the improvement of cattle gave a material impetus to it. Liberal contributions were made by philanthropic persons and as many as 125 bulls have been purchased out of His Excellency the Viceroy's cattle-breeding fund.

Cattle Breeding in Kurram Agency

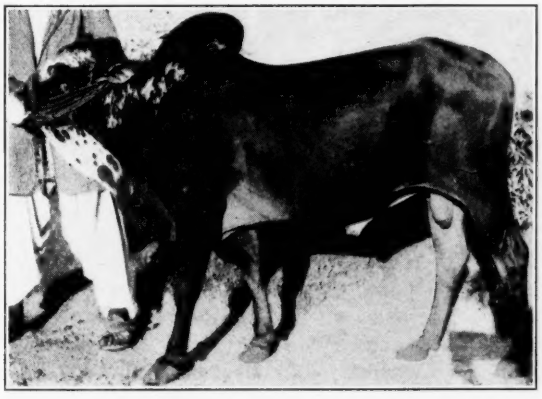
There was no cattle breeding in the Kurram Agency until 1936. However, a large response was received from the people of the Kurram Agency to the appeal issued by His Excellency the Viceroy regarding the contribution of funds towards the improvement of cattle, and when sufficient funds were collected, all the maliks and landlords were invited to Parachinar with a view to deciding by mutual agreement the breed they would like to be introduced in their country. Specimens of a variety of breeds were made available for inspection, and with one voice they decided on the importation of Lohani bulls from Baluchistan. This was immediately done and 50 bulls and 10 cows were entertained on a subsidy scheme in the year 1936, and this is still working very satisfactorily. This breed is perhaps most suited for the Agency. The bulls are small sized with red and white spots, stout, sturdy, active and possess very high stamina. Hoofs are very strong, specially needed for working in ricefields, which is the main crop of the Agency. Animals being of light weight can easily graze on the hillside and their docile nature makes their maintenance and handling very easy. This breed is very hardy and for its maintenance the scanty grazing on the hills is sufficient without any stall feeding.

Economic Value of Good Livestock

The main cause of the misery of the zamindar in India is the uneconomic vicious circle which he insists on following. The uneconomic animals are an ever-present drain on the limited resources of the countryside. They are responsible for a lot of wastage of fodder which could be converted into cash by the introduction of useful animals. One must remember that it costs almost the same to maintain a good animal as a bad, uneconomic one, but the returns in the former case are manifold. The introduction of this cattle-breeding scheme in this province has indirectly created in the zamindar a love for better stock and a hatred for uneconomic animals, thus effecting profitable savings in the resources of the country. The appreciation of the advantages of this scheme by the zamindars can easily be gauged from the fact that we are never able to meet the demand for stud bulls by the zamindars despite our distributing a very large number every year.



A Lohani Cow.



A Lohani Stud Bull.

ARTICLE BY KHAN SAHIB S. M. A. SHAH, M.R.C.V.S., PAGE 17.

Livestock Problems in Urban Areas

In cities it is practically impossible to get pure milk on account of the mischievous activities of the middleman. Various schemes to start co-operative dairies or municipal dairies have been drafted and submitted, and the co-operation of the municipalities is awaited. Certain well-to-do persons residing in urban areas keep their own milch animals, which are generally imported from the Punjab. To breed milk strains breeding in urban areas has now been taken in hand. Sahiwal bulls and Nili buffalo bulls have been located in big towns, and these breeds are well known for their milking properties. The results achieved so far have been very encouraging. Efforts are being made for more Sahiwal bulls and Nili buffalo bulls to be located at all places where these animals can best thrive and there is a demand for milk.

Sheep and Goat Breeding

Sheep breeding is another very remunerative industry, which is more suitable for certain parts of this province where cattle breeding is not possible. Various breeds of local sheep like the Ghilzai, Hashtnagri and the Daman have been surveyed from a scientific viewpoint. Some schemes to improve these breeds have also been drafted. The great problem is to improve wool and mutton. At the Tarnab Farm by crossing Pushtikoh with the Hashtnagri we have succeeded in evolving a ram which weighs 2 maunds and 38 seers (240 lbs.). It is now proposed to introduce this blood to the countryside. A scheme has also been drafted to breed Ghilzais in the Kurram Valley and Hangu Tehsil.

The arid tracts which are not gifted with anything by nature like the Teri Tehsil, the Pezu and Bain Passes of the Bannu district and portions of Kulachi Tehsil have not been lost sight of. In these tracts Merino rams have been introduced with a view to improving the quality and quantity of wool. In these tracts special attention is being paid to goat-breeding operations, and to provide milk in these arid tracts the Jamnapari breed of goats, which is well known for its milking properties, has been introduced. Thus the aim is to convert the wild bushy growth of these arid tracts into wholesome milk for the poor zamindars of these tracts.

Mohair Industry

There is a very wide scope for the development of the mohair industry in this province. The goats of Kaghan Valley bear a close resemblance to the Angora goat and I am confident that in a few generations we will be able to evolve an Angora cross which will be fairly comparable with the pure Angora. Six Angora goats (two male and four female) imported from America recently form the nucleus of the present scheme. The services of the bucks are restricted to only selected goats and favourable results are anticipated in the near future.

Buffalo Breeding

It has now been ascertained that the province cannot produce the amount of ghee (clarified butter fat) required by its population and a considerable quantity is imported every year from the Punjab. There are quite a large number of buffaloes, but on the whole they are poor milkers. By grading up these buffaloes and suitable scientific selection it should be possible to kill the Punjab trade. To solve this problem the North-West Frontier Province Buffalo Breeding Scheme has been started. It consists in the purchase of male buffalo calves from the Government Military Dairy Farm born of parents of approved milk strain. These are given to zamindars for rearing and the cost is paid by the Government. After three years these turn into fully developed buffalo bulls when they are entertained on a subsidy scheme like the bulls and a monthly allowance of Rs. 8/- is given to the keeper for maintenance and allowance of free service to the country.

Poultry Breeding

This is a very remunerative cottage industry and very useful results have been achieved at the Tarnab Farm. The poultry-breeding scheme was started in 1936 and now every hospital is the nucleus for the supply of the eggs of White Leghorn birds to the zamindars. One egg of a White Leghorn is given in return for two eggs of country birds which the zamindars very willingly exchange and in this way poultry breeding is being extended to even the remotest villages of the country. The biggest drawback in the way of successful poultry breeding is the periodic occurrence of contagious diseases like Ranikhet disease, fowl cholera, etc., which sweep away the entire stock whenever they make their appearance. Let us hope that with the establishment of a Poultry Research Section of the Imperial Veterinary Research Institute these handicaps in due course will be overcome.

Horse and Mule Breeding

There is not much demand for these operations in the country and consequently much attention has not been paid to it. Thoroughbred and Arab horse stallions and Hissar donkey stallions have been located in areas where people yet display some interest in equine breeding. Special attention, however, is paid to registration of the stock.

Camel Breeding

This has not been started so far. Data are being collected and very shortly a camel-breeding scheme on the lines of the cattle-breeding scheme will be started in special areas.

Veterinary Aid

No breeding operations can ever be successful unless adequate measures are adopted to control the scourge of cattle disease. The labours of years are

wasted in a few days and one is left in utter despair having neither the money nor the courage to restart the work and that is why the importance of animal plagues transcend all other aspects of livestock work. In 1927 we had only 17 hospitals with a very limited staff absolutely inadequate to control and prevent contagious disease. To give practical effect to this proposition and extend veterinary aid to every nook and corner of this province every effort was made to open more and more veterinary dispensaries every year and even in the presence of great opposition by the local bodies we, with our sustained labours and continuous propaganda and canvassing, have been successful in establishing 73 dispensaries and, in addition, each hospital has two touring dispensaries attached to it. These are attended once a week by the officer in charge of the hospital and in this way there is now a network of veterinary dispensaries in the province.

Rinderpest has been in existence in this province for a very long time and every year has drained away a large population of cattle. Previously outbreaks were controlled by serum alone inoculation, but the results were far from satisfactory. On several occasions a recurrence of outbreaks cast disrepute on the method of serum alone inoculation. Later serum simultaneous inoculation was practised with much better results, but this method too, on account of its high cost, could not be applied on an extensive scale. With the evolution of goat tissue vaccine and its successful application in Bengal and other provinces two veterinary assistant surgeons were deputed to the Imperial Veterinary Research Institute, Mukteswar, in 1936 to undergo training in the technique of its manufacture and application and since then we have been manufacturing our own vaccine at Peshawar. Within the very short period of 2½ years 100,059 animals have been permanently protected against rinderpest. The next dreadful disease was hæmorrhagic septicæmia. Control of outbreaks with serum alone was open to the same objection as in the case of rinderpest. Later we located areas in the province where this disease had annual recurrence and vaccination on an extensive scale has reduced the mortality to an almost negligible extent. Blackquarter is only of rare occurrence, but isolated cases are reported on occasions, and the routine control for this has been quite satisfactory. Foot and mouth disease is rather common in this province, but it is not followed by any serious consequences, yet complication in a small percentage of cases cannot be easily ignored. Permanent foot baths have been constructed at the cattle fair places, because previously these were usually the places whence infection started. Opinion is being created that such baths should be constructed in each village by the zamindars themselves on a co-operative basis.

Surgical and other non-contagious disease are treated in the hospitals and touring dispensaries free of cost. Besides the veterinary assistant surgeons make regular tours in the villages and thus extend veterinary aid to the very door of the ryot.

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Veterinary Education

Until 1927 young men of this province were not forthcoming to take up this nation-building profession. Efforts were therefore made to attract local young men to take up this profession by the award of scholarships. We have at present students studying in different veterinary colleges in addition to nine who have come back duly qualified and have been employed in the department. Eight more scholarships have been sanctioned by the Government for the coming year.

With a view to extending veterinary aid to every nook and corner of the country a class to train zamindar boys in elementary veterinary science was opened in 1935-36 for a period of six months. Thirty-five students were admitted in this class and these were given both theoretical and practical training at the Civil Veterinary Hospital, Peshawar, and those who passed the test were appointed as veterinary stock assistants to extend simple veterinary aid in the remote corners of the country.

Propaganda

The ignorance, illiteracy and apathy of the people of this province towards anything new is proverbial and therefore to create mass opinion about cattle improvement the value of professional propaganda cannot be over-estimated. Until recently we had practically nothing for the purpose and our propaganda was therefore restricted to the distribution of professional leaflets dealing with different aspects of animal husbandry and control of contagious diseases. Small lectures were also arranged at the cattle fairs, but now we have started a regular campaign against quackery and apathy of the people towards this most beneficent department. Our propaganda now consists of the following:

1. Organisation of demonstration stands at all cattle fairs and such other functions. These constitute pamphlets, brochures, photographs and charts, dealing with various aspects of animal husbandry and the control of contagious diseases.

2. Lectures at cattle fairs by microphone.

3. Broadcasting speeches regarding the activities of the department from the Broadcasting Station, Peshawar.

4. Asking Boy Scouts to sing poems regarding the veterinary profession at cattle fairs and other public functions.

5. Publishing useful information in the local papers regarding veterinary matters.

In conclusion, the services of Veterinary Assistant Surgeon M. Abdul Wahid Khan are gratefully acknowledged in assisting me to compile this note.

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HOW FAR HAS THE STUDY OF ANIMALS AND THEIR DISEASES INFLUENCED THE PROGRESS OF MEDICAL RESEARCH?

By CAPTAIN S. C. A. DATTA, B.Sc.(Calcutta), M.R.C.V.S.
Mukteswar-Kumaun.

THE phenomenon of life in all its forms is intimately connected with its environment, and the life activity of each species of creation is vitally concerned with that of others. The crux of this fundamental biological fact is the food problem. In every living being therefore there is a relentless struggle for existence going on from the very time of conception to death, as each is trying to exist by devouring the other. To appreciate adequately the intensity and extensiveness of this ever-raging warfare requires more than an ordinary acquaintance with the different grades of creation in the economy of nature. Germs and parasites of disease attack man and his animals, and epidemics and epizootics have been known to occur since the earliest times. Humanity has been constantly terrorised by the suffering and murder in individuals and communities perpetrated by disease agents. Thus the instinct of self-preservation and the longing to relieve suffering in fellow men have been the incentive to the study of the intriguing problem of disease (pain, suffering) causation. Animal diseases have been studied simultaneously, primarily from the utilitarian aspect, now enormously extended with the progress of time and civilisation, and occasionally also from the humanitarian urge. Diseases have been so poignant and sudden in their effects that to the terror-stricken ancients they appeared to be supernatural visitations. Commencing from about 500 B.C., diseases have been considered to be processes of nature, but it was not until 2,000 years later that impartial observation of nature was resorted to as the means by which to solve the mystery.

In surveying the progressive evolution of the conception of disease, one notices that the medicine of man and animals was born almost contemporaneously of the common parentage of credulity and empiricism, and that as rationalism dawned, the approaches to the problem of disease widened. The accruing benefit in the saving of life and relief of suffering applied equally to the human race as to the animal species, and the science of disease to-day forms a major study of human welfare. In this study, general principles of pathology emerged showing how changes in the bodily functions (symptoms) and organic alterations in the structure of the special and general tissues composing the living body (lesions) are set up. The concept of cells composing tissues applied to all biological sciences, and the pathological lesions were found to be

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the gross structural expressions of the disproportions in the relative values of stimuli and cell reactions (cellular pathology). The complex mechanism of predisposing factors, exciting causes, individual susceptibility and resistance, nutritional bearings, effect of climatic vagaries, and parasitic action were elucidated. Important facts regarding host-parasite relationship, parasites' methods of attack, the hosts' mechanism of partial or complete resistance due to natural factors or acquired through the aid of biological preparations or drugs, factors determining latent infections, carriers and relapses and the bases for prevention and control, etc., have come to light. Apparently trivial, and even isolated discoveries have produced profound amelioration of suffering. Ideas regarding disease control have undergone fundamental changes, and experience has shown that it is more economic and rational to prevent disease in whole communities rather than obtain cures in individuals after allowing maladies to be contracted.

Science of disease has thus marched forward through the ages, but the outstanding fact of immediate concern in this article is that any pioneer work whether that relating to microscopy, protozoa and bacteria by Leeuwenhoek, or that on bacteriology and immunology by Pasteur or Koch, Koch's postulates or his method of plating out of cultures on solid media, or Lister's work on antisepsis or similar other advances have been equally applicable to man and animals, and thus was the essential unity of the healing science brought out constantly. Specialisation in individual branches has no doubt tended to a loss of the broad perspective of comparative medicine, and depressing stages of isolation seen to intervene now and again, but the solidarity of human and veterinary medicine stands out unmistakably throughout the ages.

In the investigation of matters of health and disease, the issues involved have been so intricate and complicated that the human intellect has stumbled many a time. Had it not been for the fact that disease processes in man and animals have been mutually elucidative by throwing cross lights and analogies, the difficulties and obstacles in the understanding of conditions, which appeared to be persistently insuperable, might never have been surmounted, and both human and animal medicine would have been poorer. It may perhaps be unfruitful to try to estimate whether the human or veterinary side has benefited to a greater extent than its sister branch in this alliance of long standing, though as far as therapeutics and immunology are concerned the contribution of research upon animals to human medicine has been of such far-reaching consequences that a rough estimate even is very striking. However, attention need here be restricted to the influence exerted by animal studies on the progress of medical research. The bearing of animals as reservoirs of infection for man and the transmissibility of animal diseases to man either directly or by handling or consuming animal products have been dealt with in another article (Datta, 1938, Agri. and Livestock in India), but it is necessary to note that even in this sphere of animal diseases communicable to

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man veterinary researches have been of very great importance in the elaboration of efficient public health measures.

Without exaggerating it may be stated that the knowledge derived from the study of animals and from animal experiments has provided the basis for the development of modern human medicine, whether relating to anatomy, physiology, pathology or therapeutics. This fact is so obvious and yet is not generally appreciated. One knows that ethical considerations have prevented crucial experimentation upon man excepting in the rare instances of convicts, and that essential facts of medicine have emerged largely from analogies from experimental work in large and small animals. Without undertaking the arduous task of giving comprehensive chronological data in this matter, a few of the historical facts, particularly as they relate to the domestic stock, may be recounted. The facts speak for themselves:

The earliest anatomical model known is a clay model of a sheep's liver in Babylonia dated 2000 B.C. The earliest recorded surgical operation is the trephining of sheep for staggers. Blood corpuscles of different species of animals were the subject of early studies. The physiology of digestion, the production of glycosuria, technique of artificial insemination, also of intravenous injection were first worked out in the dog. Transfusion of blood resulted directly from the latter injection. Gland grafting was practised on fowls in 1767, and the effect of the transference of the male and female gonads was also studied on fowls by Berthold in 1849, leading to Steinach's work on the human subject. The antitoxic property of potassium permanganate in snake bites and cholera, the rational application of arsenic preparations, and the use of carbon tetrachloride are some of the drugs adopted from the sphere of animal experiments, besides the animal gland products, pepsin, insulin, adrenalin, pituitrin and others. The still baffling problem of carcinogenesis has received particular stimulus from the experimental work on fowls and dog tumours.

Turning to the domain of helminth parasites, the first one to be described was the parasite of liver-rot in sheep in 1379. Seibold's work on duck trematodes provided the first clue to the life history of flat-worms in general, and the observation in 1780 of strange cysts (hydatids) in the tissues of various domestic animals, and the subsequent finding of similar hooks and suckers in certain tape worms of man, dog and rabbits were of fundamental importance. Feeding experiments in dogs and other animals were carried out and a new method of determining if such cysts are the larval stage of a particular tape worm was evolved. These first achievements in experimental parasitology were soon extended to the production of trichinosis in healthy animals by feeding experiments with infected meat. In 1883 the complete life history of *Fasciola hepatica* was worked out, though about ten years earlier cercariæ believed to be of these parasites had been detected in snails. On these lines

were the life histories of the parasite of the more serious forms of the human schistosomiasis of Japan and Egypt worked out in 1914 and 1915 respectively.

In another branch of parasitology, the first pathogenic protozoan discovered was the *Eimeria stiediæ* of the rabbit (1674), but the finding of the equine *surra* parasite by Griffith Evans was of greater significance. More outstanding than this was the demonstration by Theobald Smith and Kilbourne in 1893 that Texas fever of cattle was a form of tick-transmitted piroplasmosis. The role of arthropoda as transmitters of protozoan conditions being thus brought to light, rapid progress followed. Two years later Bruce showed the transmissibility of *Trypanosoma brucei,* also a parasite of domestic stock, through the intermediary of Glossina flies. The immediate result of this was the elucidation of the mystery then surrounding sleeping sickness. Several distinct disease entities due to trypanosomes are now known. Similarly, Ronald Ross's discovery of the transmission of bird malaria through Culex mosquitoes led to the epoch-making discovery of the role of anopheline mosquitoes in human malaria. That spirochætes, whose exact position is somewhat uncertain, can be conveyed by the bites of blood-sucking insects was demonstrated for the first time in 1903 in the case of fowl spirochætosis transmission. The intimate relation of protozoology with entomology has consequently become a well-established fact. The profound influence of this relation has been manifested not only in the elucidation of the pathogenesis of many diseases, but the control measures that have been elaborated from a knowledge of the parasite and its vector for dealing with some of the most dreaded of human scourges like sleeping sickness, malaria or yellow fever can rightly be mentioned as the outstanding achievements in tropical medicine.

Sufficient data have been given above to show that besides the addition of individual items of information, veterinary studies have repeatedly thrown floods of light on the solution of many of the fundamental problems of disease causation and control in man, whether pertaining to parasitology or bacteriology. It now remains to be seen how in the latter domain and immunology even large pieces of research connected with human disease problems have been frequently initiated by purely veterinary studies and that the transcending results have materially altered the destiny of man.

Dealing with the highly destructive disease, anthrax in sheep, Pasteur laid the foundation of modern preventive vaccination. The anthrax bacillus was discovered in 1849 in the blood of animals dying from this disease and in 1880 Pasteur discovered the bacillus of fowl cholera. His investigations showed that the anthrax and fowl cholera organisms could be attenuated, and that vaccination of healthy animals with the attenuated germs could be successfully employed to protect against virulent infections. Again the origin of bacterial filters leading to the discovery of filtrable viruses, and of the elaboration of the memorable Koch's postulates can be traced to these early studies upon anthrax. Pasteur's work on these two animal diseases and on swine erysipelas

was carried out when he was nearly sixty years of age. World-wide interest was aroused in the potentiality of immunisation by attenuated germs, and theories to explain the process of immunity were put forward. In 1884-1886 Theobald Smith, one of the pioneers in the field of infective diseases, carried out experiments with hog cholera bacillus on pigeons and established the principle which was to find later a very wide application in human medicine. It was shown that by the injection of filtrated products of the killed specific organisms an immunity against living pathogens can be set up. This was the first experiment on immunisation along these lines, and Von Behring working with Kitasato in Koch's Institute, Roux and others followed suit. Working with the toxins of diphtheria and tetanus organisms, Behring laid the foundation of anti-toxic immunity. The serum of animals immunised against attenuated diphtheria toxins was successfully used as a protective or a therapeutic measure against diphtheria in experimental animals, and the specific neutralisation of the toxin of the disease was achieved. After the preparation had been tried out in man, the product was produced on a gigantic scale (1894) and with this specific treatment the lives of innumerable children affected with diphtheria have been saved. Many attempts have since been made to treat other specific diseases on the basis of this discovery. The methods employed to-day on large scales for the protection of man against cholera, bacillary dysentery, tetanus, snake poisoning and typhoid fever are all evolved from these early but monumental researches. Wright has extended the method to apply to therapeutic uses. In tuberculosis immunisation, B.C.G. vaccination in calves has largely determined the progress of infant vaccination.

To mention the history of one or two diseases of public health importance, all the essential knowledge on Malta or undulant fever, which is said to occur in North India, has been obtained from animal studies. Bruce in 1906 demonstrated that infection originated from a most unsuspected source, the milk of apparently healthy goats, and in comparatively recent years cow's milk containing *Brucella abortus* has been shown to cause undulant fever. In 1888 the mysterious illness of 57 persons who had eaten the meat of a sick cow was traced to what was called *Bacillus enteriditis.*

There have been other ramifications of these studies upon animals. The possibility of the transmission of bacterial agglutinins from mother to offspring was first demonstrated in goats. The final proof of the benefits of *Colostrum* as providing passive immunity to offspring and reducing the risks of bacterial infections in early extra-uterine life was put forward by Theobald Smith from his experiments on calves, and to-day this is a recognised principle in the post-natal care of infants. Again the other phenomenon of *Anaphylaxis* was suggested by the remarkable observation of Portier and Richet in 1902 that certain poisons of animal origin evoked in dogs a condition of hypersusceptibility rather than immunity. Anaphylaxis originating from the bacterial products of diphtheria was experienced by Theobald Smith, and this

discovery was designated the "Theobald Smith Phenomenon" by Ehrlich. In the subject of allergy the experience that certain people would suffer from an attack of "Horse Asthma" if they went near a stable is one of the earliest suggestions traceable. Researches on both anaphylaxis and allergy have been largely concerned with experiments in large and small animals.

Coming to the latest addition to the list of disease-producing agents, the important group of viruses, the clinical manifestations of some of which in man and animals have attracted attention from the days of Aristotle and earlier, rabies and smallpox are the first to come to mind. It is remarkable that outstanding advances in the immunology of both these conditions were achieved before there was any clue regarding their etiological agents, and that both of the diseases to be benefited from empirics should be of virus origin. Regarding smallpox, human inoculations with variola material were no doubt practised in India in the days of *Atharbaveda,* and the local country tradition that dairy-maids who had contracted cowpox through milking did not contract smallpox existed in Gloucestershire in England, and also in France and Germany. Jenner, however, deserves great credit for converting in 1880 this traditional belief or observation into a prophylactic principle in science. Turning to rabies, hydrophobia and its relation to dog bites were known from the earliest times. Pasteur's first communication on the subject was published in 1882 and the vaccine treatment elaborated by him, though modified, still holds its ground, but it was not until 1898 that Loeffler and Frosh demonstrated the filtrable nature of the cause of foot and mouth disease. With the establishment of the virus origin of one disease entity, others were soon added and bovine pleuropneumonia was a close second. Rabies had been transmitted to rabbits by Galtier in 1872 and by Pasteur, Chamberland and Roux in 1881. With the aid of this knowledge, immunisation of man with rabbit-fixed virus was carried out in 1885, and the fact that the infectivity of viruses can be modified by passage through lower animals has been a matter of wide practical application in immunology.

The failure to cultivate viruses *in vitro* had been a great handicap, and the fact that most of the human virus diseases are not transmissible to animals or are not amenable to being carried *in series* from animal to animal was a serious difficulty. A constant supply of the causative virus as required for further investigations could not be arranged, but the demonstration of the application of ferrets as experimental animals in dog distemper and swine influenza has led to their use in human influenza researches. Conclusive proof has been put forward recently that an anti-serum can be produced even from animals who are naturally insusceptible to the particular virus. The success achieved in the immunisation against distemper may turn out to be as epoch-making and far-reaching in immunology as some of the other animal analogies exploited by Pasteur and others. Regarding artificial cultivation of human viruses, while all attempts on ordinary media have failed, the success in the

case of bovine pleuropneumonia and agalactia suggests that the growth requirements of this group are peculiar. Again the "virus" of bovine pleuropneumonia has already been seen, and placed provisionally in the family *Actinomycetaceæ*, and filtrable phases of some bacteria, spirochætes, etc., are known. It may be added that structures, believed to represent the actual virus of certain other diseases, have been seen, and in this connection the demonstration of minute coccoid elementary bodies in fowlpox and vaccinia virus and others is an interesting pointer. The latest finding that at least one animal virus, that relating to Shope rabbit papilloma, is a heavy protein is also of more than ordinary significance.

THE IMPERIAL VETERINARY SERUM INSTITUTE OF INDIA

By S. R. HASSAN, M.R.C.V.S., L.M.(Dub.)

THE Imperial Veterinary Serum Institute, Izatnagar, is now known as the Biological Products Section of the Imperial Veterinary Research Institute, Mukteswar, and is under the control of the Central Government of India.

In 1933 a rectangular piece of land, comprising about 750 acres, was acquired in the plains near Bareilly to relieve the pressure of work of the parent Institute. The site was selected for its various attractions. Besides being a town of historical importance and an old Cantonment, Bareilly is the headquarters of the Commissioner, Rohilkhund Division, and the Eastern Command of the Army, with a population of 1,44,031. It is situated at an elevation of 575 feet above sea level and is climatically one of the healthiest plain towns in the United Provinces. It is also a centre of many progressive agricultural and industrial activities, especially sugar, cotton and rapeseed. The most important feature of the district is that the price of livestock animals, more particularly of buffaloes, which are used at this Institute for manufacture of sera, is moderate. The cultivators, for economy's sake, dispose of their plough buffaloes after field work is over, and substitute fresh young buffaloes at the beginning of next season. This routine proves greatly advantageous to the Institute as it ensures the procuring of a large number of young healthy

animals at a moderate price from the village markets organised by the zamindars.

The Institute itself is located about three miles from the Bareilly Town Hall and four miles from Bareilly Junction station and half a mile from the Izatnagar railway station between the Bareilly-Nainital and Bareilly-Pilibhit roads, opposite to the Central and Juvenile Jails, Bareilly, General Offices of the Rohilkhund and Kumaon Railway and Indian Wood Products Company. It is just on the outskirts of the municipal limits and therefore enjoys the combined privileges and facilities of urban and rural life. With regard to the name Izatnagar, it may be mentioned that about thirty years ago the headquarters of the deputy agent of the Rohilkhund and Kumaon Railway were established here, and the railway station was named by the company after the name of their popular agent. The entire area of the Institute is self-contained and is enclosed with a wire fence where plots are specified for residential and office buildings, serum and packing blocks, farm and stack-yards, godowns, veterinary sheds, medical dispensary and cultivation lands.

A circular metalled road starting from the main western gate connects all the residential and office buildings and terminates at the gate in the eastern side, which is chiefly meant for traffic of service and supply. There are many other unmetalled roads as well, connected with the main road and leading to different areas within the Institute.

Administration

The head of the section is designated as the "Officer-in-charge," who is a member of the General Central Service, Class 1, and is directly responsible to the Director at Mukteswar. His technical activities are conducted by two gazetted officers, viz., Veterinary Deputy Superintendent and Head Laboratory Assistant and their technical staff, and the general administration is carried out with the help of the office superintendent, accountant, head clerk and other ministerial staff.

The Veterinary Deputy Superintendent is in charge of the veterinary sub-section, and with his technical staff looks after the treatment, general management, feeding and keeping of all the animals and arranges purchase of young healthy buffaloes from clean areas for the manufacture of protective sera. After segregation of the newly purchased animals for a given period, they are prepared to receive immunising antigens for manufacture of the following sera: (1) Anti-Rinderpest; (2) Anti-Hæmorrhagic Septicæmia; (3) Anti-Blackquarter; and (4) Anti-Anthrax.

The general technical method in regard to production of the above sera consists of (a) immunisation or hyper immunisation; (b) bleeding; (c) collection of serum; (d) bulk storage; (e) biological and chemical tests; (f) bottling; (g) storage; and (h) issue.

Immunisation

For the sake of convenience the buffaloes are immunised in batches and each batch consists of a number of animals from whom the expected amount of serum will complete the capacity of a serum tank. This amount of serum is tested in one lot and is named as Brew No. —, to which the year of manufacture is also added for the information of the consumer. When any batch of immunised animals is ready for bleeding, the Veterinary Deputy Superintendent fixes the date, and one day before bleeding the buffaloes are weighed before watering and their individual weights, along with the amount of blood to be drawn from each, are communicated to the Veterinary Inspector-in-charge bleeding and the Head Laboratory Assistant.

The venesection hall has a small laboratory at its side, through which by a covered passage it is connected with the serum block. The bleeding operations are performed either on surgical improvised tables or on a sandy bed, specially prepared for the purpose, and the blood is collected in a bleeding vessel which stands on a weighing scale while the needle still remains attached to the jugular vein of the animal. When the required amount of blood has been drawn the wound of the skin is sutured, sterilised and dressed, and the animal is allowed to return to its shed. Similarly the sterilised vessels with collected blood are returned to the serum room, where they are placed in a cool room.

Young buffalo bulls between the ages of four and eight years and 700 to 1,000 lbs. in body weight are found to be the most suitable animals for use as serum-makers. Animals free from infectious diseases are purchased for the purpose through the agency of contractors, and are segregated for a period of ten days before they are actually immunised. Care is taken not to purchase an already used animal or any animal suspected to be suffering or have suffered form any of the diseases against which the serum is produced. Also the blood of the buffaloes is carefully examined for trypanosomes and *Plasmodium bubalis* before purchase. At the present time the section has restricted itself to the manufacture of four important sera, viz., anti-rinderpest, anti-hæmorrhagic septicæmia, anti-blackquarter and anti-anthrax.

Anti-Rinderpest Serum.—Young buffaloes of the type mentioned above have proved to be quite susceptible to this disease and have been found to give serum of a good potency. The animals intended to be used as rinderpest serum-makers are inoculated with a dose of 1 c.c. of rinderpest bull virus, obtained from Mukteswar, and ordinary anti-rinderpest serum at 3 to 5 c.c. per 100 lbs. body weight simultaneously at a different site from that of the virus. The animals are kept under observation for a period of eighteen days after the immunisation, when animals that have shown a desirable reaction during this period are bled at 4 to 6 c.c. per lb. body weight. The type of reaction desired in these animals after immunisation is a mild but

definite thermal reaction, and this can be achieved by regulating the dose of serum. In all, eight bleedings are taken from each animal on the 18th, 21st, 24th, 27th, 30th, 35th, 40th and 45th day after the immunisation. According to the result of the potency tests carried out at Mukteswar, the serum so manufactured is graded as "special" and "ordinary," the former being much more potent than the ordinary serum and is intended for use on highly susceptible foreign or cross-bred cattle. The ordinary serum is issued for use on the less susceptible indigenous breeds.

Anti-Hæmorrhagic Septicæmia.—This serum is intended for use as a prevention against hæmorrhagic septicæmia. Healthy animals or good conditioned animals discontinued after the anti-rinderpest serum are used for the manufacture of this serum. The animals are immunised with a dose of 200 c.c. of avirulent hæmorrhagic septicæmia culture and are bled at 6 c.c. to 8 c.c. per lb. body weight on the 8th and 10th day. After the bleeding on the 10th day a second injection of 100 c.c. of the above culture is given and the animals again bled on the 8th and 10th day at the same rate. Injections and bleedings are continued till five or six bleedings have been obtained.

Anti-Blackquarter Serum.—Animals discontinued from either of the above productions are used for the manufacture of this serum. The animals are kept segregated in a particular area. The buffaloes intended for the manufacture of this serum are dealt with as follows:

They are first injected with 50 c.c. of blackquarter vaccine, 9 days later they receive 100 c.c. of the same vaccine and on the 18th day another 300 c.c. of vaccine is injected. On the 8th and 10th day after the third injection each animal is bled at 6 to 8 c.c. per lb. body weight respectively. Two days after the 10th day bleeding the animals are again injected with 200 c.c. of vaccine and bled at the above rates on the 8th and 10th day after the fourth injection. Subsequent injections and bleedings are continued till six bleedings have been obtained, after which the animals are discontinued.

Anti-Anthrax Serum.—Animals discontinued from any of the above productions can be utilised for the manufacture of this serum, provided their condition permits of this. The first injection in the course of immunisation consists of 250 c.c. of anti-anthrax serum, followed one day later by 100 c.c. of an anthrax avirulent 48 hours' old broth culture. Eighteen days after, another 100 c.c. of the same culture is injected, which is followed 9 days later by the third injection of 200 c.c. of the culture alone. On the 8th and 10th day after the third injection the animals are bled at 6 to 8 c.c. per lb. body weight. Fourth injection of 200 c.c. of the culture is given two days after the bleeding. Bleeding and injection as above are continued till five to six bleedings have been collected.

Complications due to trypanosomiasis (Surra) and *Plasmodium bubalis* are often encountered during the course of immunisation. The former is

controlled by the injection of a dose of Bayer 205 (Naganol) whenever the parasites are seen in the blood. The smears are examined whenever the animals show a rise in their body temperature. Malarial parasites generally disappear from the blood after running a mild course, and do not necessitate any special treatment.

Laboratory or Serum Sub-Section

After the blood has been drawn from the animal it is transmitted to the serum sub-section, where the technical staff, under the Head Laboratory Assistant, proceeds with the further technical processes. The bleeding vessels, which have been specially designed and prepared locally, are at first kept in a cool place for about two hours for settling down of the blood corpuscles and separation of the plasma. The supernatant plasma is then syphoned off with sterile precautions into other sterilised vessels, which are provided with very heavy brass weights. By addition of calcium chloride solution in estimated quantities, the fibrinous portion of the plasma is solidified and as a result of the pressure the clear serum rises to the top. This serum is then syphoned off into other sterilised serum vessels, where prescribed quantities of preservatives are added to it and it is finally stored in large tanks, each of which is given a brew number. After the completion of manufacture of serum from a particular batch of animals, the tank is closed and a sample of about 500 c.c. of the brew is sent up to the Mukteswar Institute for test of its potency and bacterial content. The entire process of manufacture in the serum laboratory is carried out under very strict sterile precautions, and it is extremely gratifying to note that most of the products were found to be sterile on cultural examination. If the serum passes all the required tests satisfactorily, it is bottled and labelled with its brew number and date of passing for distribution to customers in India and elsewhere.

During 1937-38, 7,25,340 doses of anti-rinderpest, 3,24,180 doses of anti-hæmorrhagic septicæmia, 1,72,032 doses of anti-blackquarter and 23,905 doses of anti-anthrax serum were manufactured, and 4,34,250 doses of anti-rinderpest, 1,52,380 doses of anti-hæmorrhagic septicæmia, 1,82,800 doses of anti-blackquarter and 63,140 doses of anti-anthrax serum were sold to various customers.

Since the establishment of this section at Izatnagar, the policy in view has been to take up the manufacture and distribution of all the biological products of the Mukteswar Institute, but this has not yet been possible owing to the lack of a cold store, provision of funds for which has not yet been possible.

Farming

On account of the availability of a large area of land for cultivation, it has been possible to grow most of the fodder and grain required by the

serum-makers. Water has been arranged by a branch of the Sarda Canal, which enters the estate from the north-eastern side and divides into many sub-canals to reach the various cultivation areas.

Medical and Sanitary Aspects

The estate is furnished with a medical dispensary under the control of the Civil Surgeon, Bareilly. The medical officer responsible for the treatment of the employees and the sanitation of the area is a sub-assistant surgeon attached to the Juvenile Jail.

Domestic Water Supply

Supplies of water for domestic purposes are now available from a newly constructed tube-well and reservoir, into which the water is forced by means of an electrically driven pump.

THE OCCURRENCE OF EQUINE NASAL BOT, RHINŒSTRUS PURPUREUS (BRAUER, 1858) IN INDIA

By M. ABDUSSALAM

Demonstrator, Punjab Veterinary College, Lahore (India).

On March 7, 1938, the author had an opportunity of examining the head sinuses of a donkey which had been destroyed for the operative surgery class at this college. The animal had been shot through the head by means of a humane killer and the blood that flowed out of its nostrils brought out two living œstrid larvæ with it. On opening the sinuses three more larvæ were found in the left frontal sinus where they had attached themselves to the mucous membrane by means of their mandibular hooks. The area around the site of their attachment was intensely congested and inflamed. Soon after the sinus was opened the larvæ detached themselves and tried to crawl away to dark corners in the sinus. They were, however, picked up, and on examination proved to be the third stage larvæ of *Rhinœstrus purpureus* (Brauer, 1858), the occurrence of which does not seem to have been previously recorded

in India. Two specimens of the larva were forwarded to Professor W. S. Patton, at Liverpool, and he kindly confirmed the identification.

Rhinœstrus purpureus is already known to be parasitic, in its larval stages, in the nasal sinuses of the horse in many countries in Europe (Russia, Spain, Austria and Hungary), in Asia Minor, Siberia, Palestine, and in Africa, Seguy (1924) reported its occurrence in the mule and Grunberg (1904) found the larvæ of this species in the nasal cavity of a zebra near Lake Nyasa in Africa. So far as the writer has been able to ascertain, there is no previous record of the larvæ of this species parasiting a donkey.

Fletcher and Sen (1930) had pointed out that *Rhinœstrus* and some other œstrid genera, "some forms of which are important pests of domesticated animals in certain other parts of the world, are as yet entirely unrepresented in India. It is possible that species of these may turn up in India, having been imported with their hosts." In the present case, however, the host animal was born locally and had spent all its life in Lahore and its suburbs. It is therefore certain that the fly is capable of breeding in India. As to whether it has been recently imported into India from some of the countries mentioned above, or is of long standing in this country, it is not possible for the present writer to say.

As regards the pathogenic effects of these larvæ, most authors are agreed that their presence in the nasal sinuses is attended with a somewhat acute type of sinusitis, but their effects are more serious when they are located in the pharynx or the larynx. Neveu-Lemaire (1912) writes that when attached to the larynx these larvæ cause dyspnœa which may be so serious as to cause asphyxia and death. Grua (1931) found the larvæ of this species in the tonsillar crypts of one out of the eighty horses examined post-mortem by him.

Besides being a serious pest of equines, this species has been known to parasite human beings in the countries in which it occurs. There are several cases on record of the occurrence of the first stage larvæ of *R. purpureus* in the human eye, resulting in an impairment or even complete loss of eyesight. Some early Russian authors and Fülleborn (1919) held the view that most cases of human ocular myiasis were due to this species; but Larrousse (1921) pointed out that a proportion of such cases may in reality have been due to *Cephalomyia* (*œstrus*) *ovis*, the first stage larvæ of which are very likely to be confused with the same stage of *R. purpureus*. He drew attention to the more important differences between these two larvæ and reproduced Porchinsky's figures of both species. Seguy (1937) in his recent review of human ophthalmomyiases points out that *R. purpureus*, although a less frequent cause of the disease, is much more serious than *Œstrus ovis*. The fly can deposit as many as forty larvæ at one effort, which cause ulceration of the conjunctiva and possibly loss of the eye.

For the purpose of facilitating the task of identification of this species

by veterinary workers in this country, the following description of the third stage larva is quoted from Fiebiger (1912):

"Third stage larva is 17.5 mm. long and 7 mm. broad. It is bony yellow in colour and somewhat elliptical in shape. The upper surface is convex and the ventral is flat but curved in its length. On the upper surface there is a spindle-shaped intermediary pad in each interannular space from the third ring backwards. On the ventral surface there is a pair of central and a pair of marginal papillæ on every ring, the marginal one being situated on a pad. There are two strong oral hooks and two thick short antennal papillæ. The last ring is very small and there is a half-moon shaped pit on its posterior surface. Separated from the pit by a transverse groove is a projection ('accessory body') which bears a large papilla on either side. Both the half-moon shaped stigmal plates are set in the pit. On the upper surface there are two to three rows of spines up to the fifth segment. On the sixth to eighth segments the spines are present only on the sides. The rest of the segments are all naked. On the ventral surface there are one to four rows of spines on each segment."

It may be mentioned that some authors (e.g., Brupmt, 1910) have designated the present species as *Rhinœstrus nasalis* (De Geer, 1776), but, as pointed out by Rodhain and Bequaert (1915), this is incorrect. De Geer wrote of the larvæ of this species under the name *"Œstre de la tete du cheval."* This, however, cannot be accepted as a zoological name because it is not in conformity with the approved binominal form of nomenclature. *Œstrus nasalis* Linn, 1761, on the other hand, is a species of Gastrophilus.

Before concluding, the author wishes to express his most grateful thanks to Khan Sahib Professor Karam Ellahie for his valuable help and guidance, and to Professor W. S. Patton, of the School of Tropical Medicine, Liverpool, for very kindly examining the larvæ and confirming the identification. I am also grateful to Messrs. Abdul Aziz Khan and Dharam Chand Sood, both of the final year class at this college, for drawing my attention to these grubs.

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ON A NEW FEATHER MITE PARASITIC ON THE INDIAN DOMESTIC FOWL (GALLUS BANKIVA MURGHI)

By M. ABDUSSALAM
Demonstrator, Punjab Veterinary College, Lahore (India).

Two males and four females of the species described in this paper were collected by the writer from two young chickens at Mukteswar (Kumaon Hills) in September, 1935. The mites were found hidden under the epidermal scales that were being cast off from the healthy skin under the wings. On examination they were found to be a new species of the genus *Rivoltasia* Canestrini, 1894.

The genus *Rivoltasia* was proposed by Canestrini (1894) for those epidermoptic mites in which the " abdomen " of the male was divided behind into two lobes and which had no claws on their tarsi. Thus, he included in his new genus the special *Epidermoptes bifurcata* Rivolta, and *Pterolichus dermicola* Trouessart, which occurred on the domestic fowl (*Gallus domesticus*) and the house sparrow (*Passer domesticus*) respectively. He himself added to this genus the species *R. latior* which is the epizotic on *Garrulus glandarius* in South Tyrol. Berlese (1897) described a new variety, *R. bifurcata* var. *major*, occurring on *Perdrix rufa* in Europe. Banks (1909) published a somewhat meagre and poorly illustrated description of a species, *R. bispinosa*, occurring on pigeons in Canada. He (1915) has reproduced a somewhat inadequate drawing of the female of this species in his well-known review of Acarina (Fig. 259). Vitzthum (1931) refers to one of Haller's species, *R. quadrata*, in this genus.

Rivoltasia karamellahiei, sp. nov.

The male is brownish white in colour and is nearly one and a half times as long as broad. The opisthosoma splits behind to form two diverging " abdominal " lobes, pointed at the end and bearing one incrassate long and two small setæ at the tip. A thin chitinous membrane borders these lobes. The dorsal surface is marked by fine lines, one of which, running transversely in the middle of the body, is more marked than the rest and divides the pro- from the meta-podosoma. There is a pair of

short setæ situated at the bases of the first legs on this surface, which seem to stand vertically in the living mite. Two more pairs of weaker setæ are present opposite the third and the fourth legs and another pair occurs on the opisthosomal lobes ("abdominal" lobes) at the junction of their anterior and middle thirds.

The ventral surface is also traversed by fine lines which run in different directions in the various parts. The epimera of all the legs are free at their tips and are not very heavily chitinised. The penis and the accompanying genital apparatus is situated in the middle line opposite the epimere between the third and fourth legs. The genital suckers are situated a little in front of the middle of the opisthosomal lobes and are separated from each other by a distance which is nearly one and a half times as much as their diameter. Among the setæ on the ventral surface, the most prominent pair is the one arising almost from the lateral border just in front of the third legs. Each of these setæ is very stout but not so long as the one arising from the tip of the opisthosomal lobe. There is another comparatively thinner, long hair arising just behind and median to this stout seta. In addition, there are a few smaller hairs on the ventral surface. There are three pairs, situated at the bases of the first, third and fourth legs respectively; a pair is situated on the sides of the genital apparatus and two pairs—one in front of and one behind the genital suckers.

Free segments in each leg are five in number; the writer is unable to distinguish any pretarsi. All the tarsi are rounded at the tip, devoid of any claw and each bears an ambulatory sucker with a short unsegmented stalk. First three legs are almost equal in size, but the fourth leg is somewhat bigger. The tarsus of the fourth leg is notched on the median side; the notch is rounded in its depth and from it arises a fairly slender hair. Setæ are more numerous on the first two legs, and they are more frequent towards the tip on all legs.

The female is somewhat quadrate in shape and dirty white in colour. The opisthosoma is not divided behind as in the male but is broadly rounded; it bears at the tip a stout, long and a small thin seta on either side. The dorsal surface is traversed by fine skin lines, but there is a rectangular area on the hysterosoma which is quite smooth. The pair of stout setæ at the bases of the first legs and two pairs of smaller setæ opposite the third and fourth legs are present as in the male. A small hair is situated on each posterior angle of the smooth quadrangular area mentioned above.

The ventral surface is also traversed by fine lines. The epimera of the first legs are joined at their free ends with a small transverse bar. The tips of the other epimera are free. The genital opening is situated in the posterior part of the proterosoma behind the transverse epimeral bar and an "epigynium" is present. The anus is a longitudinal slit situated in the median line near the posterior border. Chætotaxy of the ventral surface is,

in general, similar to that of the male. The two pairs of setæ, one long and stout and the other slender, are present near the lateral border in front of the third legs, as in the male. There is a small seta between the first and second epimeres opposite the base of the first leg, and another one at the base of the third leg, but there is none opposite the fourth leg (which is present in the male). There is a pair of setæ, one on either side of the median line, in the middle of the metapodosoma. Two more pairs are situated immediately in front of the anus.

The legs are almost equally developed; the first leg is slightly thicker.

The idiosoma of the male is 0.160 mm. long and 0.114 mm. broad; idiosoma of the female is 0.171 mm. long and 0.139 mm. broad.

HOST: *Gallus bankiva murghi*, the Indian domestic fowl.

LOCALITY: Mukteswar, Kumaon Hills, U.P. (India).

Among the known species of *Rivoltasia*, the present species comes nearest to *R. bifurcata* (Riv.), but differs from it in that the notch on the tarsus of the fourth leg of the male bears a hair instead of a tooth and that the tibia of the fourth leg in the female bears no tubercle. Further, the present species differ from all others of *Rivoltasia* in that an epigynium, distinct from the transverse bar uniting the epimera of the first legs, is present. Canestrini and Kramer (1899) in defining this genus state that the epigynium is absent. It is, however, probable that in the species listed by them the epigynium may be fused with the transverse bar uniting the free ends of the epimera of the first legs, as is the case in *R. quadrata* Haller (see Vitzthüm, 1931). In view of the above, the writer considers the present form a new species and proposes to name it as *Rivoltasia karamellahiei* after his former teacher, Khan Sahib Professor Karam Ellahie, Professor of Parasitology, Punjab Veterinary College, Lahore.

PATHOGENICITY: No ill effects were observable on the skins of the chickens on which this mite occurred. In the early veterinary literature a cutaneous acariasis of a psoric character ("gale furfuracée") has been attributed to the presence of *R. bifurcata* and the allied *Epidermoptes*. Neumann (1909), in reviewing these observations, however, points out that at least in some of these cases the psoriasis was attributable to other causes, like the fungus of favus (*Lophophyton gallinæ*) or the depluming itch mite (*Cnemidocoptes lævis* var. *gallinæ*). He advises that in cases of dermatosis supposed to be caused by these mites, "il sera toujours bon de s'assurer s'il ne faut pas la rattacher plûtot à la teigne."

The writer tenders his most grateful thanks to Khan Sahib Professor Karam Ellahie, Professor of Parasitology, Punjab Veterinary College, Lahore. and Mr. S. K. Sen, M.Sc., F.R.E.S., Entomologist, Imperial Veterinary Research Institute, Muktesar, for their kind help and valuable guidance. The

author is also indebted to Hakim Mohammad Hanif, artist at this college, for inking his pencil sketches.

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LIVER FLUKE DISEASE IN SIND

By J. H. G. JERROM, M.R.C.V.S.

PREVIOUS to 1932, when the Sukkur Barrage was completed, this disease was of little importance in this province, where the rainfall is very scanty. After the Barrage canals began to operate and provide water over practically the whole province, the incidence of liver fluke gradually increased, and now far exceeds that of any other disease.

Previous to 1935, curative treatment was of little value, as drugs like male fern, etc., were too expensive to use on a large scale. In consequence, the owners of affected animals seldom reported the existence of the disease.

In 1936, having read of the good results obtained in Australia by the use of carbon tetrachloride, which is obtainable at a reasonable price, it was decided to introduce this method of treatment.

The result has exceeded all anticipations, so much so that the Department has now great difficulty in meeting the requests of owners for the treatment of their animals.

At the beginning we were faced with the difficulty of estimating the dose for cattle and buffaloes, as it is not given in the textbooks, which state that cattle are unusually susceptible to this drug. Eventually I decided to give a 5 c.c. dose, and many thousands of cattle and buffaloes were treated in this manner, the dose being repeated in about six weeks. We have now

found by experiment that cattle and buffaloes can take a much larger dose of carbon tetrachloride, and we have increased it to 8 to 10 c.c. This gives better results, and it does not appear necessary to repeat the dose. Originally the drug was mixed with liquid paraffin but this was found to be expensive, and it is now given mixed with four to five parts of sweet oil, obtainable in any bazaar, and administered by means of an ordinary glass and vulcanite glycerin syringe.

Sheep and goats are given doses of 1 to 2 c.c. in a similar manner.

The drug is given after fasting for at least twelve hours, otherwise tympany sometimes occurs.

The results have been excellent in all animals, but the treatment of milch cows and buffaloes is often spectacular, the animals putting on condition and giving an increased milk yield in a very short time.

The numbers of animals treated during the last two years were as follows :

Year	*Buffaloes and Cattle*	*Sheep and Goats*
1936-37	5,172	7,244
1937-38	22,848	20,029

EXISTENCE OF OTOCARIASIS (EAR MANGE) IN GOATS IN INDIA

By R. N. NAIK, G.B.V.C.
Veterinary Investigation Officer, Bombay Province

VANDERIJST (1913) and Roubaud and Van Saceghem (1916) have recorded the existence of otocariasis in goats in the Congo State, Africa. Hutyra and Marek (1926) state that this form of scab, which occurs enzootically only in the Congo State, manifests itself by the collection of brown, fungus-like scabs in the external auditory meatus, which form firm plugs in the ear passage and cause deafness. The affected goats show diminished appetite and perish after several months of illness. A perusal of literature at the disposal of the writer shows that the existence of this condition has neither been recorded in other parts of the world nor particularly in India, where goat breeding is extensively carried on. The writer has, therefore,

in this communication given the results of his investigation into an outbreak of this condition which was detected by him in the Province of Bombay during the year 1936.

A disease characterised by circling round and round as if affected with gid and showing occasionally symptoms of fits was noticed in a herd of goats maintained by a mission farm in the Poona District. There were six goats which had shown these symptoms, out of which four had already succumbed and two were leading a lingering life. Examination of the cranial bones of the affected cases revealed no signs of any softened area. Symptomatic treatment given to them failed to effect any lasting relief, so one of the affected goats was destroyed and a careful post-mortem examination held. There were no gross pathological anatomical changes produced in any organs as a result of the disease. The ear passage was at last dissected out and a collection of brown soft scabs was found accumulated in the external auditory meatus. These scabs showed under the microscope a large number of mange mites: *Psoroptes capræ* (*Psoroptes communis var capræ*), identification of which was subsequently confirmed by the Imperial Veterinary Research Institute, Muktesar. All goats in the herd were thereupon examined carefully, and twenty-one goats were found having in their ear passage the scabby materials containing live mites.

Symptoms

In the early stage of the disease the affected goats appear apparently quite healthy. A careful observation, however, reveals that they evince some sort of irritation in their ears by scratching them with their hoof or rubbing them on some hard object, such as wall, pillar or stone. As the disease progresses the frequency of scratching the ears is increased, and the animal remains disinclined to graze sufficiently, as a result of which progressive debility is slowly brought on. In the advanced stage the root of the ear becomes thickened, with formation of prominent parallel ridges on the ventral side, and feels hard and rather rough to the touch. (*vide* Plate I). In the last stage the goat begins to show symptoms of turning round and round, and occasionally goes into fits of frenzy during which period it gets its horns and eyes frequently injured very seriously, due to dashing of the head violently on the ground or some other hard object. Animals which have reached this stage rarely live for more than a couple of months. They utterly neglect feeding, due to which they are reduced to a mere skeleton. They usually show broken horns and fly-blown, ulcerating eyes or enucleated cornea, and ultimately die.

Treatment

A liniment prepared by mixing one part each of creosote and methylated spirit and ten parts of common oil was applied to the affected cases as a

Otocariasis (Ear Mange) in Goats.

ARTICLE BY R. N. NAIK, G.B.V.C., PAGE 43.

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curative agent, and the same liniment further diluted with equal quantity of common oil applied as a preventive to all other healthy goats. The application was made by a brush deep into the meatus. A microscopic examination carried out on the scabby materials collected twenty-four hours after the application of this liniment showed about 5 per cent. viable mites, but the same carried out after three applications at weekly intervals failed to reveal any parasites at all. The outbreak, due to this treatment, subsided completely within a period of three weeks and did not reappear during the subsequent period of two years during which periodic examination has so far been made.

Acknowledgment

This work was carried out as part of the duties of the writer, whose budget is partly subsidised by the Imperial Council of Agricultural Research, Delhi. The writer desires to express his indebtedness to Mr. E. S. Farbrother, M.R.C.V.S., I.V.S., Director of Veterinary Services, Bombay Province, for his valuable guidance in this work.

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UROPYGITIS IN DOMESTIC FOWLS

By M. MOHEY-DEAN, M.R.C.V.S.
Bombay Veterinary College

Synonyms

KANTA, or oil gland disease.

Definition

It is a non-contagious, chronic inflammatory condition of the rump sebaceous gland.

Introduction

Kanta in Hindustani means a thorn. The name is very apt, because the tip of the gland becomes pointed like a sharp cone.

The gland is a sebaceous gland situated at the root of the tail above the *cloaca*. Along with the muscles in which it is imbedded it resembles a saddle to a great extent. The free end is pointed upwards and backwards and terminates in a small finger-like process, which carries a few small feathers at its tip. At the tip there is a sinus or canal which communicates with the body of the gland. In an adult healthy fowl the size of this structure is about 1.5 cm. by 1 cm., and the length of the tip is about 3 mm.

It is said that a bird, while preening its feathers, carries on its beak a greasy secretion from this gland to its feathers in order to give them a shine and make them waterproof to some extent. However, the presence of this gland is not essential for this purpose, as it does not exist in some species of birds and in spite of this their feathers are quite waterproof. Moreover, in some fowls the gland has been extirpated on account of disease, and such fowls still retained the lustre of their feathers.

History

This disease is not described in any English literature which the author had the opportunity to study. Mention of it is, however, made by Miss Fawkes (Lucknow), and Henry Gray (London) has devoted a short chapter to this disease in his book, " Diseases of Cage and Aviary Birds," which is a reprint of his paper from the *Veterinary Record*, March 21, 28, and April 4, 1936.

The author has not been able to find any Indian literature dealing with this disease, but it is known to exist all over India. In most parts of the country it is known by the name " Kanta," and those people who keep poultry are quite familiar with the disease and its treatment. The author has been familiar with this disease for many years and its importance was realised by him in 1933, when most of the birds in a flock of about fifty (in a suburb of Bombay) were found to be suffering from it.

The conclusions in the following paragraphs are based upon the study or close observation of 200 to 300 cases.

Occurrence

" Kanta " is found all over India. All breeds of fowls are liable to it, but it is not so common in Aseel birds (Indian game). It has not been seen in birds under six months. Birds of both sexes suffer from it, but it is very rare in male birds. Heavy layers suffer more than others. The disease is uncommon in those flocks which roam about in open fields or extensive ranges, but it is by no means uncommon in those which are kept in villages and towns and allowed to roam about in the streets and gutters.

The incidence is greater in wet than in dry weather.

This disease has been observed in other birds, such as canaries, bullfinches, mynas, etc.

Ætiology and Causes

In a diseased gland, all the symptoms of inflammation are present, but it is difficult to say whether this disease is a result of inflammation brought about by some infectious disease or caused by blocking of the duct, resulting in accumulation of sebaceous matter and subsequent inflammation of the gland. In all probability the inflammation is due to accumulation of sebaceous matter on account of the inability of the gland to discharge it, or blocking of the duct.

This disease has been observed to occur under the following circumstances:

When birds are kept in unhygienic houses and runs, where the ground is constantly muddy (ducks may thrive on such grounds, but it is deleterious to the health of fowls in every respect), where the flooring of houses or runs is made of cinders and coke and the birds have no access to dust or sand baths.

It has been seen in birds which are constipated, or in birds which have been suffering from diarrhœa for a long time. Debilitated birds are prone to this disease, but sometimes it is a cause of debility. It has been observed in birds suffering from a subacute form of spirochætosis and in birds recovering from an attack of fowl cholera.

It is not known if mechanical injury or infection from a wound is capable of bringing about this condition.

Symptoms

A bird otherwise healthy looking may be seen roaming about in an uncomfortable manner, sitting down, standing up and occasionally pecking at the grain. It neither follows other birds in a flock, nor seeks to avoid their company. If pain is severe it will be found sitting in a dark corner, as if it were going to lay an egg. The region of the tail when manipulated is painful. If the disease is not of long duration the bird is in quite good condition, and as a rule there is no fever, provided that the bird is not suffering from some infectious disease. On separating the feathers of the tail above the cloaca the gland is found to be enlarged, in some cases double the normal size. The area near the tip is inflamed, while the tip is highly congested and painful, and in some cases it may reach about 1 cm. in size. The small feathers on the tip stand out prominently. In some cases it is possible to squeeze out the contents of the gland easily, while in other cases the gland is so hardened that the secretion cannot be properly squeezed out. The exudate is brownish looking and semi-solid or cheesy in consistency. If only the tip is pressed, sometimes serous or sero-sanguinous exudate is extruded.

In a majority of cases the cloaca is filled with hard fæces. In neglected or long-standing cases the condition of the bird deteriorates gradually; it ceases to take food and may succumb to the disease in fifteen to thirty days.

If a bird is attended to while in good condition it invariably recovers. The mortality in debilitated cases may reach over 50 per cent.

Treatment

There are various household remedies, such as covering its posterior part with hot ashes for about fifteen minutes, at the same time massaging the affected part. After this treatment the bird is given a little oil or ghee by mouth and some of it is applied on the gland.

Turmeric paste is prepared in water or rape seed oil and applied on the gland and round about it. Or turmeric root is charred and while still unbearably hot is applied to the tip of the gland. This treatment is not very successful. On the other hand, if the inflamed tip is pinched and pressed and then hot turmeric root applied more recoveries occur.

The following treatments have been tried and found successful:

(1) In delicate birds, hot fomentation with boric lotion for about half an hour, squeezing the gland, and application of boric ointment have given good results.

(2) After preliminary disinfection of the area, holding the inflamed tip with forceps and cutting it at the base with blunt scissors, squeezing out the contents as far as possible, and injection of Tr. Iodine or Argyrol (10 per cent.), has been found most successful. In some cases, when it is not possible to squeeze out the contents at the first attempt, this treatment will have to be repeated after two or three days. This is followed by olive oil or grey powder, and nutritious sloppy food is advised.

Of two dozen birds treated in this way recovery was recorded in twenty birds. Those which died were very much emaciated before the treatment was commenced.

In some cases it was observed that the rump gland resembled an abscess and the skin covering it was necrosed.

After disinfecting the area with Tr. Iodine a melon slice incision was made, the gland dissected out as far as possible, and detached along with its muscular attachments. Hæmorrhage was arrested with silver nitrate stick, the area coated with Tr. Benzoin and a little boric and zinc oxide powder dusted over it. The owners were advised to feed the patient on ata (flour) and ghee.

Ten birds were treated in this manner, one of them being a cockerel. Six seen one month after the treatment appeared healthy, and four had died or could not be traced.

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EPIDURAL ANÆSTHESIA IN INDIAN CATTLE AND BUFFALOES

By ABDUL HAMID, L.V.P.

Clinical Assistant, Department of Surgery, Punjab Veterinary College, Lahore.

EPIDURAL anæsthesia, i.e., anæsthetising the hind parts of the body by injection of a local anæsthetic in the epidural space near the end of the spinal canal, is only of recent origin. Cathelin (1901) introduced the method in obstetrical practice and it was first practised in other branches of Surgery by Stockel (1909). In veterinary practice the method was used as late as 1926 by Professor Benesch, of Vienna. In the same year he toured America and demonstrated the new method on the Continent. In Britain the method was first used by Brook (1930) on cattle, who published a detailed description of the method he practised. Hitherto this method does not seem to have been employed in India.

The writer, working at the Punjab Veterinary College Clinic, where the daily average of patients treated is about 200, often experienced many difficulties in handling obstetrical cases satisfactorily, with the usual narcotics and general anæsthetics. Chloroform, chloral hydrate, cannabis indica, potassium bromide and other sedatives and narcotics when administered internally, in addition to their bringing about anæsthesia and preventing straining, etc., during operation, also produce some deteriorating effects on the various systems of the body of the animal, from which the patient takes some time to recover. These may sometimes derange some of the systems so seriously as to bring about pathological changes in some of the vital organs of the body.

For facilitating operations on the hind quarters and for handling obstetrical cases with more comfort the writer conducted experiments on cattle and buffaloes. It was, however, soon realised that epidural anæsthesia was by far the most useful method at our command to meet these requirements. The writer has practised Benesch's method on 125 patients during the last two years with satisfactory results. There being little reference on epidural anæsthesia among Indian cattle and buffaloes, it is necessary to deal with its technique in some detail. A glance at the sacrococcygeal region of Indian cattle and buffaloes will show that it slopes downwards and backwards and is raised in an upward direction towards the lumbar region. This is quite the opposite of what is seen in the western cattle.

The meninges of the spinal cord begin to diminish in size about the middle of lumbar region and end in the cone-shaped " cauda-equina " at about the middle of the sacral region. The dura mater is the outermost of the three

coverings of the spinal cord. The epidural space, between the dura mater and the bony canal, occupies the whole of the canal from the middle of the sacrum to a variable distance in the coccygeal region.

It is into this space that the puncture is made.

The Seat of Injection and its Location.

In majority of cases the seat of injection is between the first and second coccygeal vertebræ. The writer has, however, made the injection quite successfully between the last sacral and the first coccygeal vertebra in those animals in which the first coccygeal bone did not appear to be fused with the sacrum.

The point of puncture is easy to determine. The tail is grasped and moved up and down. The point at which the movements cease is the first coccygeal articulation. Immediately behind this point is a laterally compressed bony ridge, or the summit of the first coccygeal spine, posterior to which, on the dorsal side of the root of the tail, is a definite depression. It is at the lowest point in the middle line of this depression that the needle is inserted. In lean subjects the site can easily be located by firmly passing the thumb from the point of the croup along the dorsal middle line of the sacral region. The seat of injection is marked by a greater depression than at other articulations of the sacrum and tail. It feels soft on pressure.

The spinous processes of the coccygeal and sacral vertebræ project upward and backward. They overhang the spinal canal. Due to this characteristic upward and backward slope of the croup and tail, and the overhanging spinous processes of this region, the needle cannot be introduced in a vertical direction. To make an injection, a hypodermic needle is placed at the lowest point of this funicular depression, right in the middle line at an acute angle, and gently pushed forward till it is felt that the needle has entered a hollow space. The syringe is then attached to the needle and the anæsthetic injected.

Needles and Syringes.

Ordinary Record Syringe needles have been used with entire satisfaction, the total length of the needle being 4 cm., external diameter 1.6 mm., and the internal diameter 1.0 mm. The capacity of the syringe to be used depends upon the amount of local anæsthetic to be injected. Where a larger amount is indicated a 20 c.c. Record Syringe is often better. For smaller injections a 10 c.c. syringe serves quite well.

Mode of Injection.

The injection is usually carried out in the standing position. In parturition cases, if the animal be disinclined to stand, due to exhaustion or pain, it is performed in the recumbent position.

The animal should stand on a well-bedded place and secured with a strait-jacket. An assistant is made to hold and control the head. The seat is located as described above. After absolute surgical cleanliness and disinfection, the operator stands behind the animal with the needle in the right hand, while the left hand defines the seat of puncture. The needle is then pushed in gently at an acute angle. It is then steadily pushed forward, taking care to maintain the exact middle line position. A distinct sensation is imparted to the hand of the operator when the needle enters the epidural space. The syringe is then attached to the needle, and the fluid injected. There is practically no resistance met with in injecting the fluid if the needle is in the right place. If the needle be in any other position the injection of the fluid becomes practically impossible. Should the needle come in contact with the bony floor of the spinal canal it is to be slightly withdrawn before the injection is made.

Local Anæsthetic and Its Dosage.

The writer has used for the past two years Parsetic (Ethocaine hydrochloride 2.25 per cent. with Adrenaline 1 in 30,000, Parke Davis & Company, London) with satisfactory results. The factors which govern the estimation of the dose are the physical condition of the animal, the amount of adipose tissue and the length of the spinal canal. Experience is the best guide for estimating the dose. As a rule, the following dosage may be employed in average sized Indian cattle :—

For operations on the tail, anus and vulva	5 to 7 c.c.
For operations in the vagina, rectum and pelvic urethra	10 to 15 c.c.
For handling cases of Dystokia, embrotomy, etc. ...	25 to 35 c.c.
For operations on hind limbs and mammary gland ...	80 to 100 c.c.

Complications.

The writer, who can claim to have practised the method extensively on 125 patients over a period of two years, has never experienced any complication. Hoffman (1937), however, mentions the following complications that he has met with in his practice :—

1. " In three cows after an anæsthetic injection of 10 c.c. paralysis of the tail followed and it could not be used against insects or lifted when dunging. After several months the paralysis declined, but never completely disappeared. In my opinion the cause was an infection of the spinal canal—a mere trauma could hardly be the cause.
2. " In three animals two or three weeks after injection abscesses formed at the site of the puncture. In one stud bull the tail was carried strongly to the left. In an aged cow, after abscess formation, paralysis of the tail occurred and continued. In two animals after opening the abscesses recovery followed.

3. "In the above stud animal after a few weeks we were called upon to perform myotomy on the anus-penis muscles. 100 c.c. of 1 per cent. solution of tutocain was used. It was difficult to inject and had no effect.

"Probably growths were formed in the spinal canal as a result of the earlier purulent process. We have no knowledge whether such cases often occur since anæsthesia is seldom performed twice on the same animals.

"Absolute surgical cleanliness and disinfection of the site of puncture and pure solution are essential in anæsthesia.

4. "It sometimes happens that with a minimal dose 10 c.c. of solution an animal may fall down, with 15.-20 c.c. it often occurs. Care should be taken that good bedding is put under the cow, and the head fastening suitable and safe. In one of our cows we had a broken horn and another the cow got her head fast between the bars in front and only by quick removal of the bars was she saved from strangulation. In some cases it is wise to let an animal down with improvised slings.

5. "One interesting case occurred in a bull which was operated on account of impotence and in the region of sigmoid flexure both anus-penis muscles were severed. The operation was performed in a meadow and 80 c.c. of a 1 per cent. solution of tutocain was injected and the bull went down with its head much lower than its hind end.

"Immediately alarming symptoms occurred, laboured breathing, rolling of the eyes and opening of the mouth. It looked as if death would occur. The bull was quickly turned with its head uphill. After five minutes the startling symptoms disappeared. In this case the solution had run cranialwards and affected nerves of the head, etc. Death would have followed in a short time if the position had not been quickly corrected.

"In using large quantities of anæsthesia a flow of solution towards the head must be avoided."

The writer wishes to record his sincere thanks to Captain U. W. F. Walker, M.C., I.V.S., and Ch. Mushtaq Ahmad, Hospital Surgeon, for their valuable guidance and the facilities provided for conducting this work.

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News

WOOL: ITS PRESENT-DAY EMPIRE SIGNIFICANCE

By TOYE VISE

Wool is a builder and true upholder of Empire; and the maintenance of the health, and improvement in stock, of the great and valuable flocks of sheep in Great Britain, Australia, New Zealand and South Africa are but two of those immensely important imperial services rendered by the Veterinary profession that are all too apt to be taken for granted by the Government and the people.

Almost a fifth element, wool itself is accepted in the like large and general fashion as are air, fire, earth and water; and, therefore, all kinds of synthetic products—as being something remarkable and new—are brought daily into a comparatively easy prominence.

There is urgent need for examining the economic position that has arisen.

Drastic efforts are being made in Germany, Italy and Japan to reduce their consumption of imported wool and wool textiles in favour of artificial products. German scientists have been obediently busy to "prove" that "staple fibre is just as warm as wool, and that heat conservation is not a function of the fibre but of the weave and nature of the fabric." This curious statement has even been repeated in a recent wool textbook.

Up to five years ago German purchases of Australian wool alone averaged 100,000,000 lbs. This figure has been reduced to 40,000,000 lbs. Italy is heavily "bearing" wool; while Japan has decreed a reduction of 60 per cent. in wool textile production.

And the end is not yet!

In these closely-knitted countries, grimly determined upon ruthless policies of self-sufficiency, the challenge is to *wool*; a challenge in which the producers of Great Britain and the Dominions, British manufacturers and British workpeople are vitally concerned.

The trading inter-relationship between the Home Country and the Dominions is brought out most significantly by the following facts and figures:

In 1936, roughly one-fifth of all British exports were taken by the three Dominions, Australia, New Zealand and South Africa. They were valued at £89,000,000.

And, in this special connection, it must be noted that *the purchasing power*

of these Dominions depends to an overwhelming extent upon the continued well-being and development of the British Wool Industry.

The latest figures are supplied in the decennial census of British textile production taken in 1935. In that year the British Wool Textile Industry gave direct employment to 241,000 persons, and produced goods to the value of £129,000,000 (£32,000,000 exports), not only using up wool from 13,000,000 British sheep, but that from tens of millions more from the Dominions.

If shepherded together in the period 1936-37 the sheep of Australia, New Zealand and South Africa would have numbered a colossal flock of 178,000,000, with respective folds of 112,000,000 sheep, 31,000,000 sheep and 35,000,000 sheep.

The value of wool exports in 1936-37 from Australia amounted to £A.62,000,000, representing 43 per cent. (excluding gold) of total exports; New Zealand, £N.Z.15,000,000, or 23 per cent. total exports; and South Africa, £11,000,000, representing 41 per cent. (excluding gold) total exports. And as the preponderating bulk of these exports came to the United Kingdom, it will be gathered how important a factor wool is in inter-Empire prosperity.

The veterinary work done in connection with the Australian sheep industry is highly organised. Within the various States animal health problems are dealt with by the veterinary officers of the Departments of Agriculture concerned. Moreover, there is a Commonwealth body, the Council for Scientific and Industrial Research, of which the Division of Annual Health and Nutrition undertakes independent research on problems of national scope and co-operates with the State Departments of Agriculture and other interested organisations. As a rule the work is carried out on the broad basis of the eradication of disease, the improvement in nutritional standards, the elimination of parasitic infection, and so on. Prevention on the grand scale, rather than cure of individual animals, is the keynote of the Commonwealth's veterinary research.

Reviews

The Anatomy of the Horse. By GEORGE STUBBS, 1766. With a Modern Paraphrase by PROFESSOR J. MCCUNN, M.R.C.V.S., M.R.C.S., L.R.C.P., assisted by MR. C. W. OTTAWAY, M.R.C.V.S. London: G. Heywood Hill, Ltd. Price £2 2s., with 18 plates.

THE original atlas of the horse by George Stubbs was a classic compila-

tion first published in 1766 and was at once recognised both at home and abroad as a masterpiece. It is now so rare that it is seldom to be found except in museums or in the libraries of collectors. The new edition just published is designed to revive a lost familiarity with the work of this famous eighteenth century artist and anatomist.

His Grace the Duke of Portland, K.G., G.C.V.O., has written his appreciation in the foreword and this edition is dedicated to him as a mark of appreciation of all that he has done for the equine race.

There are eighteen plates, together with a key-plate for each, which is exactly the same size as in the original, and in addition reproductions of two of Stubbs' famous pictures are included at the commencement of the book. The excellence of the plates is a marvellous achievement and is difficult to appraise as a production of the eighteenth century. In this edition the finest collotype and lithographic processes, together with good quality paper, have been used so that none of the original clarity and delicacy have been lost. The text consists of a tabulated description of the plates and is presented in the original form, together with a modern paraphrase by Professor J. McCunn assisted by Mr. C. W. Ottaway, so that the historical interest of the work remains unimpaired while modern terminology has been introduced. This new edition thus presents authorities on the anatomy of the horse both past and present. The text is inserted in the book apart from the plates, but if that portion in connection with each plate had been inserted adjacent to the plate which it describes the convenience for the reader would have been considerably increased.

The plates will have a special appeal to painters, sculptors and designers while the entire work will offer a general working knowledge of the structure of the horse to the horse-loving public, including the agriculturist, and will facilitate the study of the anatomy of this animal by students of veterinary science. It will also have a strong appeal to the sentiment of the historian.

Manual of Veterinary Bacteriology. By RAYMOND A. KELSER. Third Edition. London: Baillière, Tindall and Cox. Pp. xiii + 640, with 93 illustrations. Price 27s.

IT is a long time since I read such a good book. The reading of it is an encouragement to study, for the author has adopted a mode of expression so helpful in its clarity that one is rarely at a loss to follow the subject.

The author's knowledge and enthusiasm creeps out in such a way that the reader is absorbed and finds it difficult to put the book aside.

Here is no dry-as-dust accumulated facts which bore one, but the expression of a born teacher.

The nomenclature and classification of bacteria adopted by Bergey has again been adhered to. It may be rather confusing to some, but as the old

names are given in the text any difficulties in this respect are easily overcome.

There are excellent chapters on infection and immunity, serology and protozoal diseases; others dealing with hæmatology, the preparation of biological products, and milk examination, etc.

The names of many workers in the field are often mentioned, giving added interest and reward—often all they get for their arduous study and research.

The practitioner, the laboratory worker and the student will find it a very helpful book to possess.

Personal

MR. JOHN WILLETT.

Congratulations to Mr. John Willett, one of the Honorary Veterinary Surgeons to H.M. the King and a Past-President of the R.C.V.S. (1936-37), on the appearance of his name in the New Year Honours as a Member of the Victorian Order (Fifth Class).

COLONIAL VETERINARY SERVICE.

Beaton, W. G., M.R.C.V.S., D.T.V.M. (Senior Veterinary Officer), Deputy Director of Veterinary Services, Nigeria.

Henderson, Miss Ruth Mary, B.V.Sc., M.R.C.V.S., Bacteriologist, Kenya.

Lowe, H. J., M.R.C.V.S. (Senior Veterinary Officer), Director of Veterinary Services, Tanganyika Territory.

Mackintosh, Captain W. L. S., M.R.C.V.S., D.V.M., D.T.V.M. (Veterinary Officer), Senior Veterinary Officer, Uganda.

Simmons, R. J., M.R.C.V.S. (Senior Veterinary Officer), Director of Veterinary Services, Uganda.

Miss Henderson is to be congratulated as this is the first occasion on which a woman graduate of the profession has gained an appointment in the Colonial Service.

OBITUARY

Death has fallen somewhat heavily within the ranks of the profession recently and we offer condolences to the relatives of Veterinary Colonel Jack Meredith, of the Household Cavalry (retired), Mr. Haydon Leggett (aged 96), who at one time attended the dogs of H.M. King Edward VII, Major W. L. Harrison, C.B.E. (Cairo), on Christmas Day, Mr. Wm. Henry Brooke (70), who was for many years treasurer of the Midland Counties Veterinary Medical Association, and Mr. John R. Green (late of Nottingham) at the age of 73.

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